

PROJECT: 33220.1.1 ID: B-3677

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33220.1.1 (B-3677)	1	24

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33220.1.1 (B-3677) F.A. PROJ. BRSTP-3135(4)
COUNTY MECKLENBURG
PROJECT DESCRIPTION BRIDGE ON SR 3135 OVER IRVINS CREEK
BETWEEN NC 51 AND SR 3128

SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK

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.

PERSONNEL

J. K. STICKNEY

C. L. SMITH

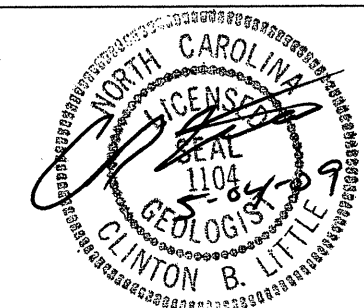
J. E. ROLFSMEYER

INVESTIGATED BY E. BEVERLY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE APRIL, 2009



DRAWN BY: J. E. ROLFSMEYER

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.

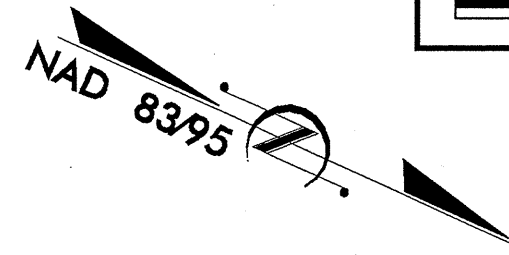
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

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, GRN. SKTY CLM, MOST WITH INTERBEDDED FINE SAND LAYERS, HGRY 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 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 IMPERVIORUS 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 (SCRC) - 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				MINERALOGICAL COMPOSITION				WEATHERED ROCK (WR)				NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.			
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.				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.			
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				SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				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.			
SYMBOL				PERCENTAGE OF MATERIAL				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.			
% PASSING #10, #40, #200				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				WEATHERING				FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.			
LIQUID LIMIT PLASTIC INDEX				GROUND WATER				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.			
GROUP INDEX				MISCELLANEOUS SYMBOLS				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.			
USUAL TYPES OF MAJOR MATERIALS				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION				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.			
GEN. RATINGS AS A SUBGRADE				SOIL SYMBOL				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>			
PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30				ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT				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>			
CONSISTENCY OR DENSENESS				INFERRED SOIL BOUNDARY				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>			
PRIMARY SOIL TYPE				INFERRED ROCK LINE				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.			
COMPACTNESS OR CONSISTENCY				ALLUVIAL SOIL BOUNDARY				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.			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)				DIP & DIP DIRECTION OF ROCK STRUCTURES				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.			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				SOUNDING ROD				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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.				SOFT CAN BE GROOVED 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.			
TEXTURE OR GRAIN SIZE				ABBREVIATIONS				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 FINGERNAIL.				SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.			
U.S. STD. SIEVE SIZE OPENING (MM)				AR - AUGER REFUSAL				HARD				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.			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)				BT - BORING TERMINATED				MODERATELY HARD				SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.			
GRAIN MM 3/8 7/8 2.0 0.25 0.075 0.005				CL - CLAY				MEDIUM HARD				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.			
SOIL MOISTURE - CORRELATION OF TERMS				CPT - CONE PENETRATION TEST				SOFT				STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				CSE - COARSE				VERY SOFT				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.			
LL - LIQUID LIMIT				DMT - DILATOMETER TEST				DIP & DIP DIRECTION OF ROCK STRUCTURES				TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
PL - PLASTIC LIMIT				DPT - DYNAMIC PENETRATION TEST				BENCH MARK: #3/4 RAILROAD SPIKE IN TREE LOCATED +/- 9.0' BACK FROM END BENT ONE AND +/- 39.0' LEFT OF EXISTING CENTERLINE. ELEVATION: 655.10 FT.				NOTES:			
OM - OPTIMUM MOISTURE				F - FINE				FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.							
SL - SHRINKAGE LIMIT				FOSS. - FOSSILIFEROUS				MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.							
PLASTICITY				FRAC. - FRACTURED, FRACTURES				INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.							
NONPLASTIC 0-5 VERY LOW				FRAGS. - FRAGMENTS				EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.							
LOW PLASTICITY 6-15 SLIGHT				EQUIPMENT USED ON SUBJECT PROJECT				DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST							
MED. PLASTICITY 16-25 MEDIUM				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 2 1/2" TUNG.-CARB. CORE BIT				HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -N Q -H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST							
HIGH PLASTICITY 26 OR MORE HIGH				COLOR				INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.							
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.				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.				INDURATION							

SKEW = 75

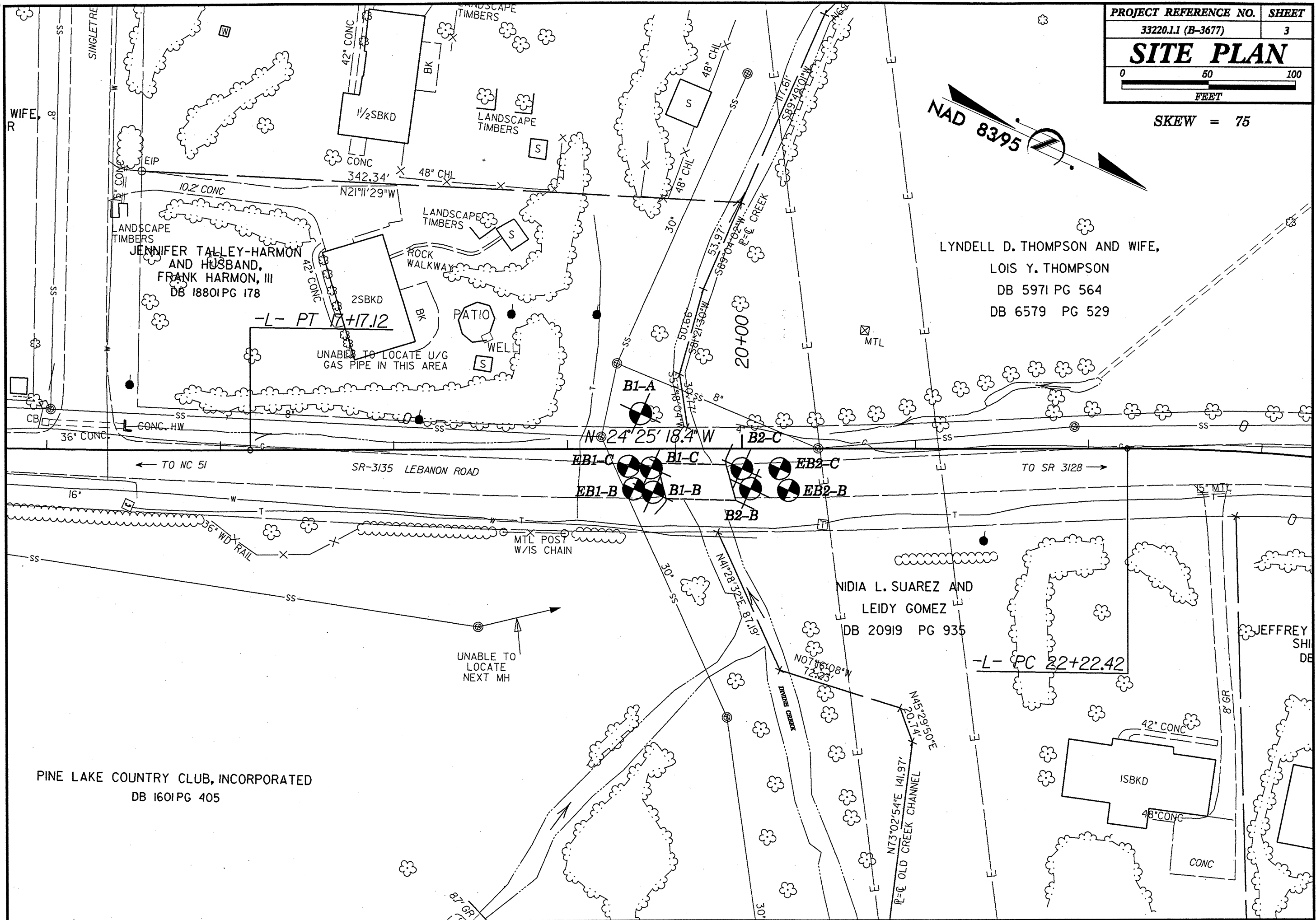


LYNDELL D. THOMPSON AND WIFE,
 LOIS Y. THOMPSON
 DB 5971 PG 564
 DB 6579 PG 529

JENNIFER TALLEY-HARMON
 AND HUSBAND,
 FRANK HARMON, III
 DB 1880 PG 178

NIDIA L. SUAREZ AND
 LEIDY GOMEZ
 DB 20919 PG 935

PINE LAKE COUNTRY CLUB, INCORPORATED
 DB 1601 PG 405



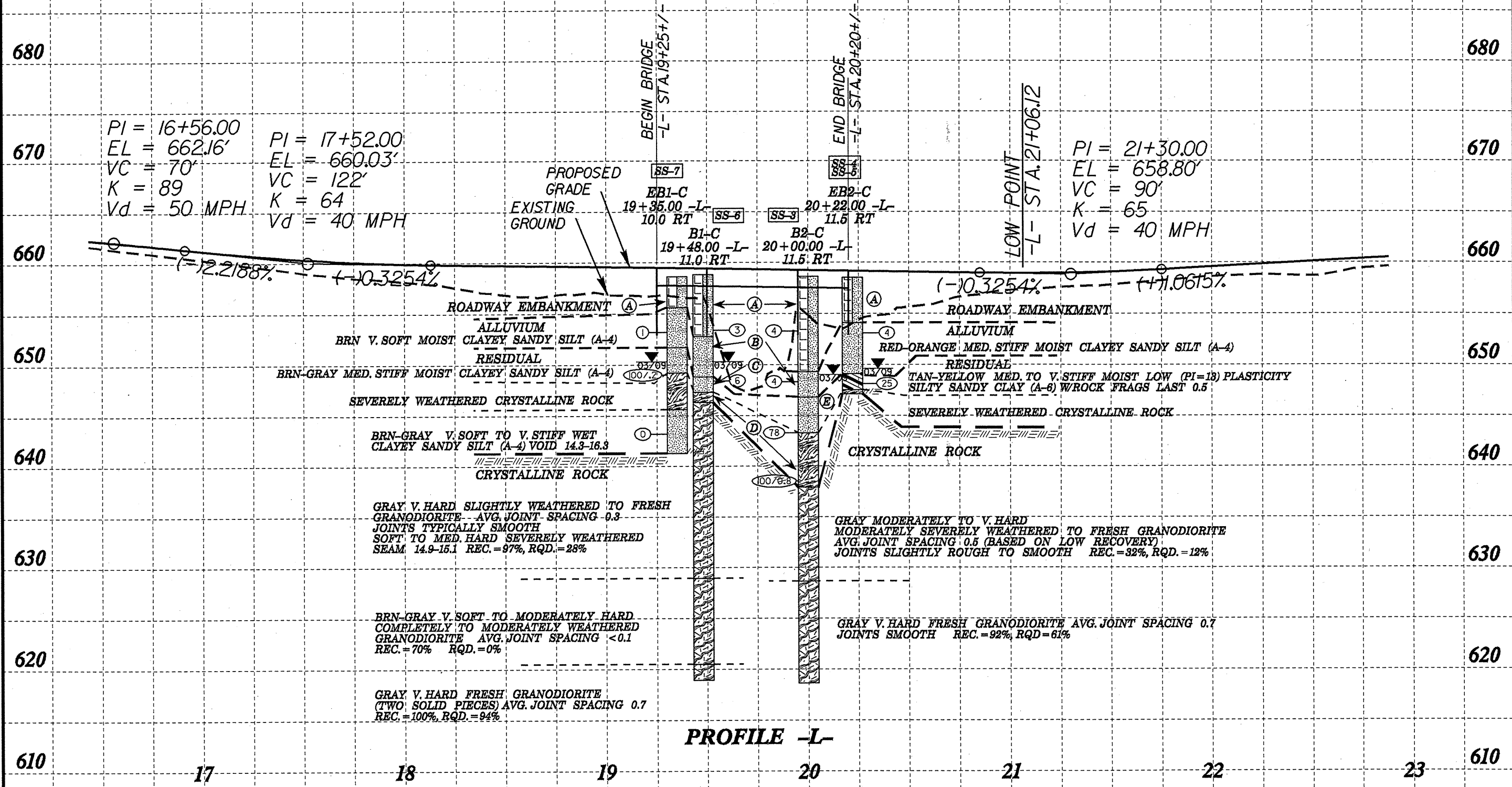


STRUCTURE HYDRAULIC DATA		
DESIGN DISCHARGE	= 2.237	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN ELEVATION	= 658.2	FT
BASE DISCHARGE	= 3.053	CFS
BASE FREQUENCY	= 100	YRS
BASE ELEVATION	= 659.0	FT
OVERTOPPING DISCHARGE	= 5.000	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 660.93	FT

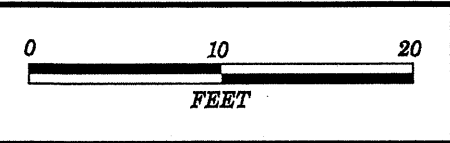
BM# 533-01
-BL- STA. 18+47.91 OFF 5.22' LT
ELEV. = 656.500
CITY OF CHARLOTTE SURVEY MARK
(CITY OF CHARLOTTE PUBLISHED ELEV. = 656.08')

BM# 2
-BL- STA. 19+32.36 OFF 290.09' LT
ELEV. = 653.306
RR SPIKE IN THE BASE OF A 15" HAWTHORN.

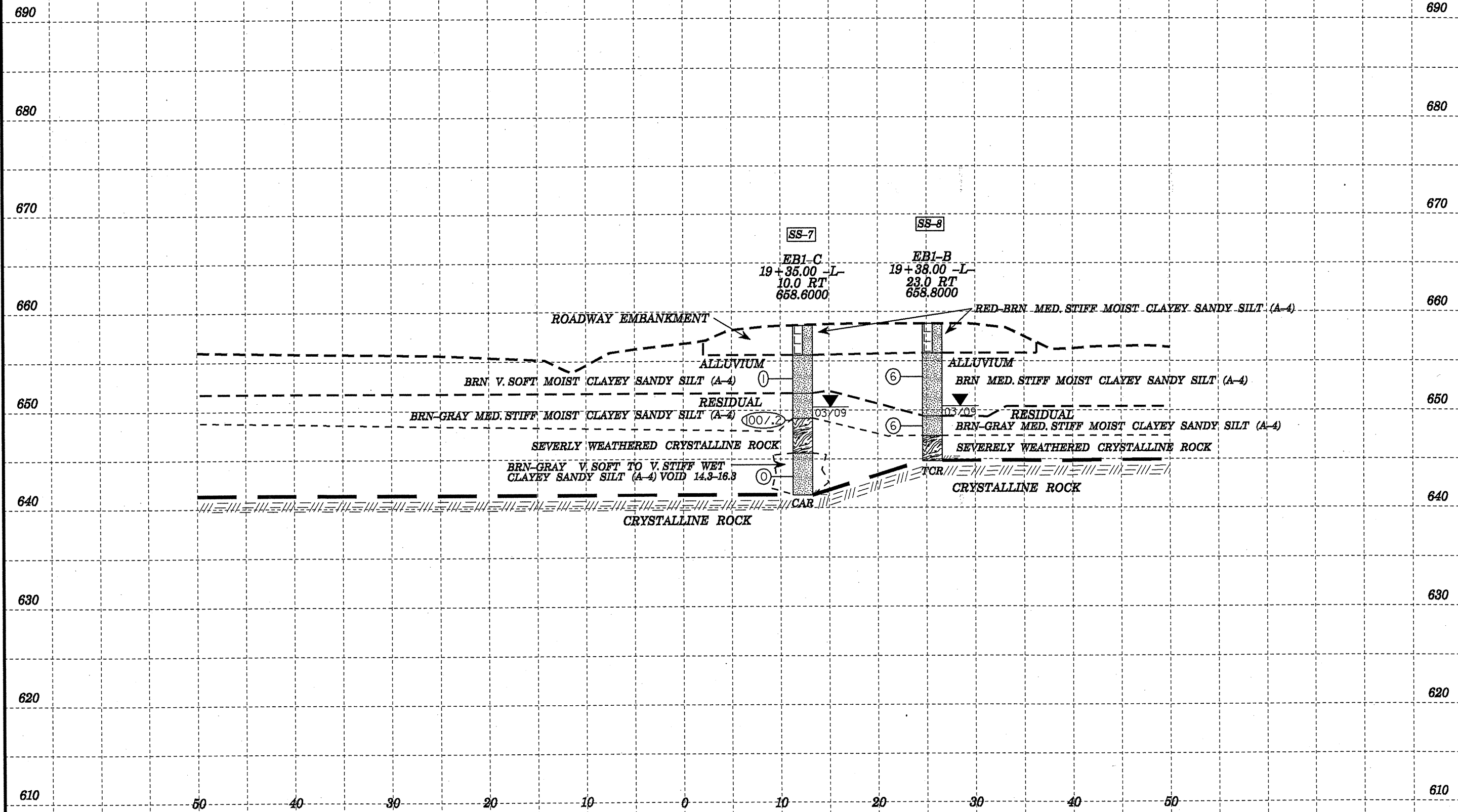
- BORING DESCRIPTIONS**
- (A) (ROADWAY EMBANKMENT) RED-BRN MED. STIFF TO SOFT MOIST CLAYEY SANDY SILT (A-4)
 - (B) (ALLUVIUM) BRN-GRAY SOFT TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
 - (C) (RESIDUAL) GRAY-BRN MED. STIFF MOIST TO WET CLAYEY SANDY SILT (A-4)
 - (D) SEVERLY WEATHERED CRYSTALLINE ROCK
 - (E) (RESIDUAL) BRN-GRAY-WHITE STIFF MOIST CLAYEY SANDY SILT (A-4) W/QUARTZ GRAVEL NEAR BOTTOM

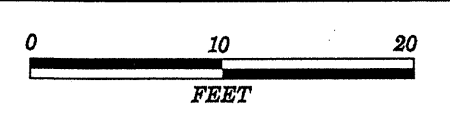


PROFILE -L-

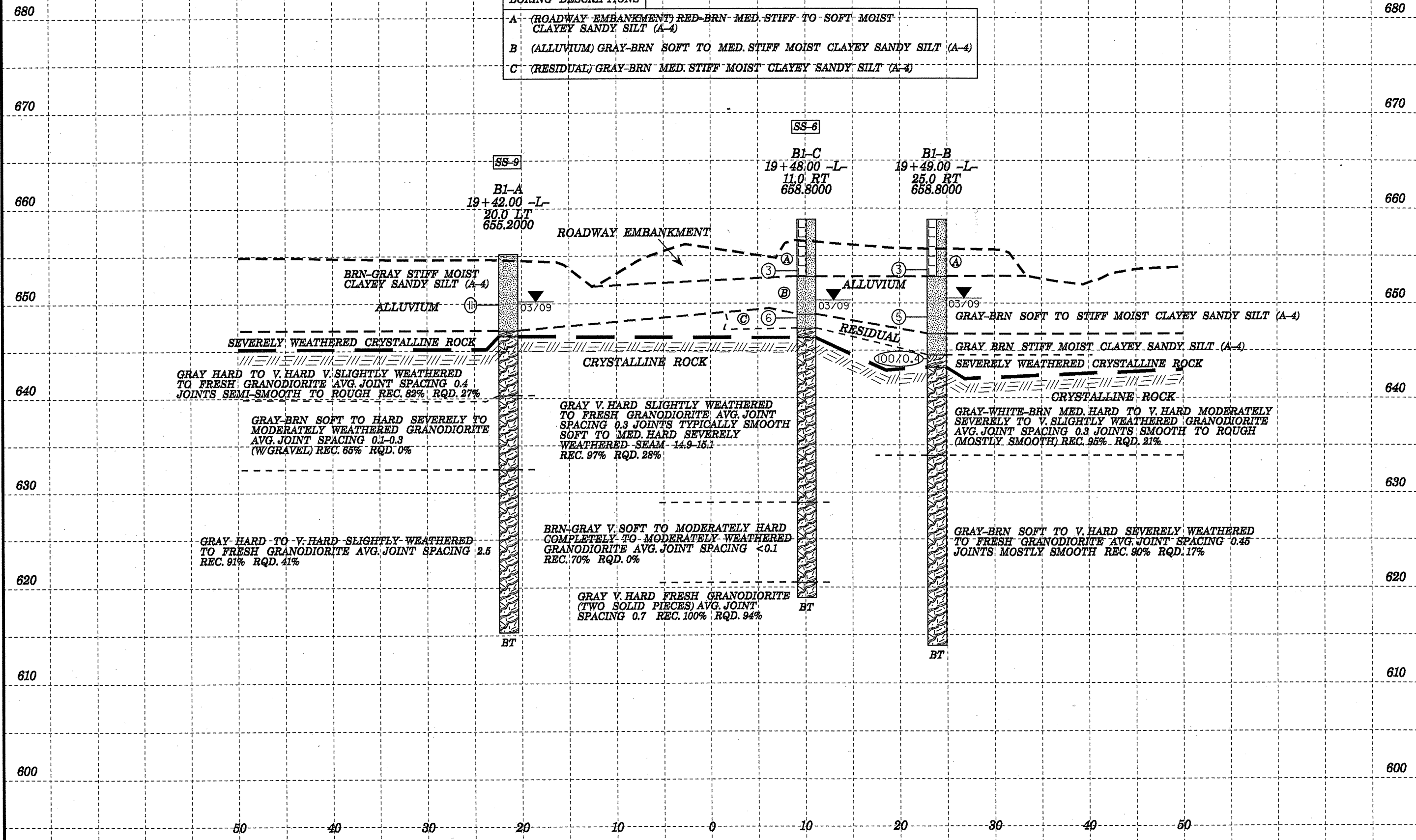


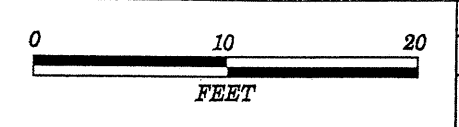
PROJECT REFERENCE NO.	SHEET
33220.1.I (B-3677)	5
SECTION THRU END BENT ONE	
STA. 19+25 -L- W.P. #1	
SKEW=75	





BORING DESCRIPTIONS	
A	(ROADWAY EMBANKMENT) RED-BRN. MED. STIFF TO SOFT MOIST CLAYEY SANDY SILT (A-4)
B	(ALLUVIUM) GRAY-BRN. SOFT TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
C	(RESIDUAL) GRAY-BRN. MED. STIFF MOIST CLAYEY SANDY SILT (A-4)





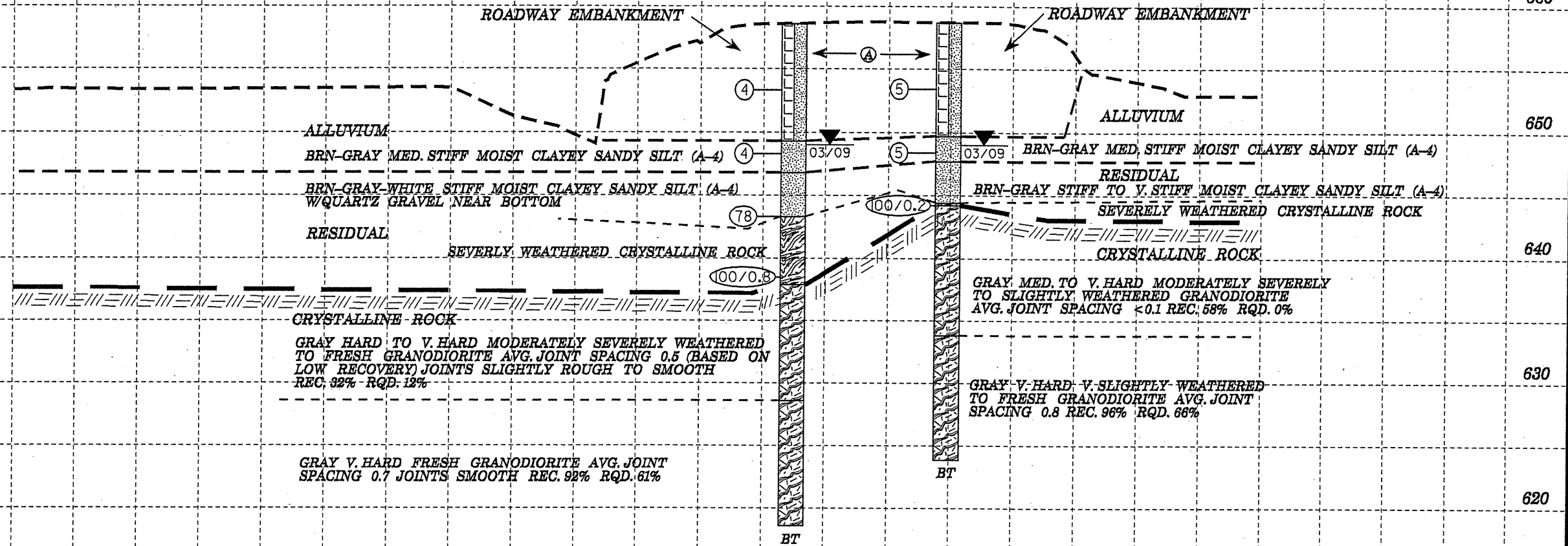
680
670
660
650
640
630
620
610
600

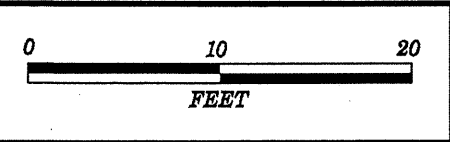
680
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BORING DESCRIPTIONS
A (ROADWAY EMBANKMENT) RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)

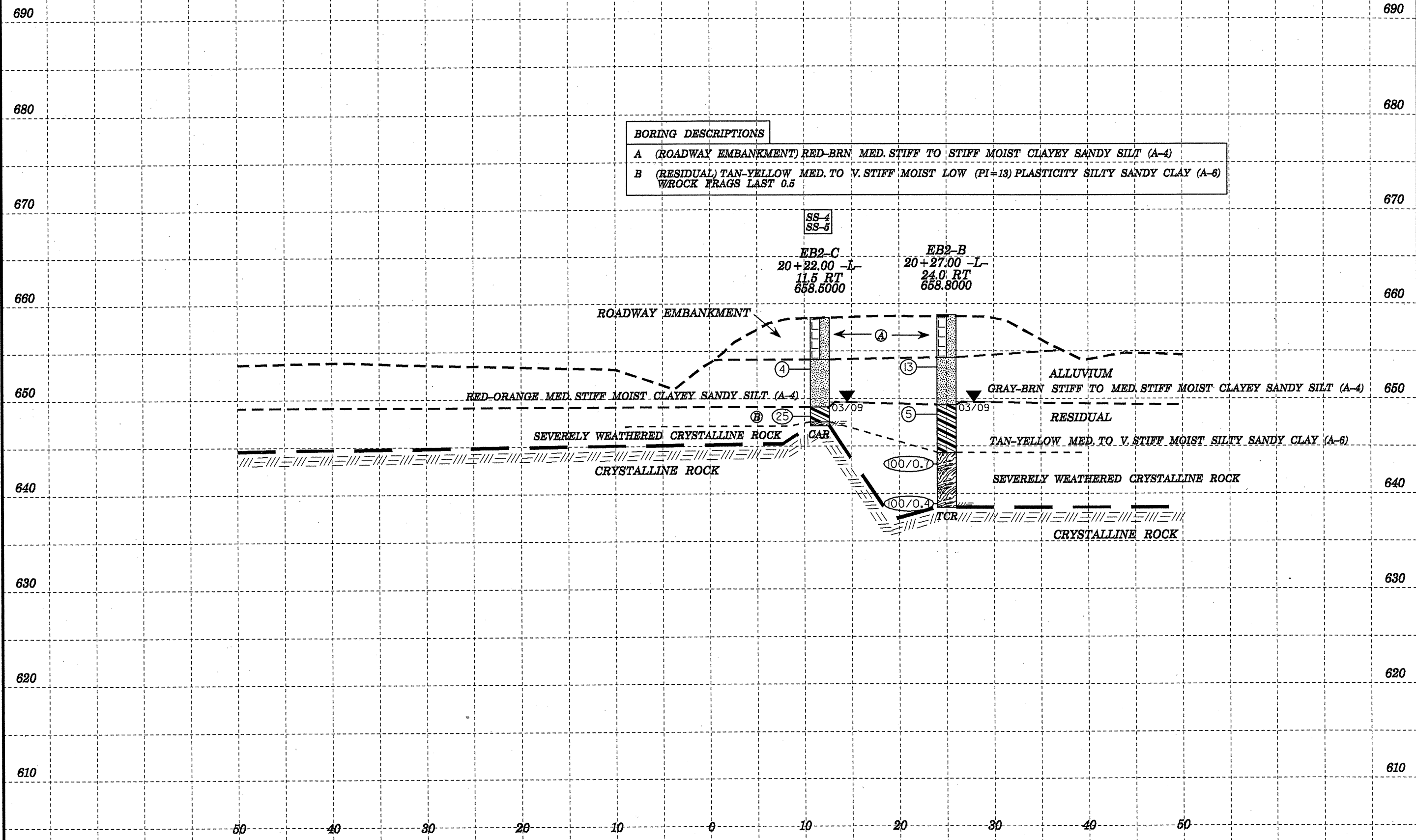
SS-3
B2-C
20+00.00 +L-
11.5 RT
658.6000

SS-1
SS-2
B2-B
20+05.00 -L-
23.0 RT
658.7000





PROJECT REFERENCE NO.	SHEET
33220.1.1 (B-3677)	8
SECTION THRU END BENT TWO STA 20+20 -L- SKEW = 75	



BORING DESCRIPTIONS

A (ROADWAY EMBANKMENT) RED-BRN MED. STIFF TO STIFF MOIST CLAYEY SANDY SILT (A-4)

B (RESIDUAL) TAN-YELLOW MED. TO V. STIFF MOIST LOW (PI=13) PLASTICITY SILTY SANDY CLAY (A-6)
W/ROCK FRAGS LAST 0.5

SS-4
SS-5

EB2-C
20+22.00 -L-
11.5 RT
658.5000

EB2-B
20+27.00 -L-
24.0 RT
658.8000

ROADWAY EMBANKMENT

RED-ORANGE MED. STIFF MOIST CLAYEY SANDY SILT (A-4)

ALLUVIUM
GRAY-BRN STIFF TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)

SEVERELY WEATHERED CRYSTALLINE ROCK

RESIDUAL
TAN-YELLOW MED. TO V. STIFF MOIST SILTY SANDY CLAY (A-6)

CRYSTALLINE ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR

TCR

100/0.4

100/0.4

03/09

03/09

4

13

25

5

B

A

50 40 30 20 10 0 10 20 30 40 50

690

690

680

680

670

670

660

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650

650

640

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630

620

620

610

610

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. EB1-C	STATION 19+35	OFFSET 10ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.6 ft	TOTAL DEPTH 17.3 ft	NORTHING 519,709	EASTING 1,495,086
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 03/09/09	COMP. DATE 03/09/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.3 ft

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				
660													GROUND SURFACE	0.0
													ROADWAY EMBANKMENT	
													RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	3.0
655	654.2	4.4											ALLUVIAL BRN V. SOFT MOIST CLAYEY SANDY SILT (A-4)	6.9
			1	0	1						SS-7	M		
650	649.2	9.4											RESIDUAL BRN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.4
					100/2					100/2			WEATHERED ROCK	
													SEVERLY WEATHERED CRYSTALLINE ROCK	13.0
645	644.2	14.4											RESIDUAL BRN-GRAY V. SOFT TO V. STIFF WET CLAYEY SANDY SILT (A-4) VOID 14.3-16.3	17.3
			0	0	0								Boring Terminated with Casing Advancer Refusal at Elevation 641.3 ft ON CRYSTALLINE ROCK	

NCDOT BORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 19+38	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 14.0 ft	NORTHING 519,717	EASTING 1,495,096
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 03/09/09	COMP. DATE 03/09/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.0 ft

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				
660													GROUND SURFACE	0.0
													ROADWAY EMBANKMENT	
													RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	3.0
655	654.4	4.4											ALLUVIAL BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	6.9
			1	2	4							M		
650	649.4	9.4											RESIDUAL BRN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.4
					0	2	4				SS-8	M	WEATHERED ROCK	
													BRN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	11.4
645	644.8	14.0											SEVERLY WEATHERED CRYSTALLINE ROCK	14.0
													Boring Terminated with tricone refusal at Elevation 644.8 ft ON CRYSTALLINE ROCK	

NCDOT BORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-A	STATION 19+42	OFFSET 20ft LT	ALIGNMENT -L-
COLLAR ELEV. 655.2 ft	TOTAL DEPTH 39.9 ft	NORTHING 519,703	EASTING 1,495,055
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/10/09	COMP. DATE 03/10/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 8.7 ft

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						
660															655.2	0.0
655														GROUND SURFACE		
650	650.9	4.3	4	6	5						SS-9	M		ALLUVIAL BRN-GRAY STIFF MOIST CLAYEY SANDY SILT (A-4)		
645														WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	647.1	8.1
640														CRYSTALLINE ROCK V. SLIGHTLY WEATHERED TO FRESH GRANODIORITE	646.5	8.7
635														CRYSTALLINE ROCK SEVERELY TO MODERATELY WEATHERED GRANODIORITE	640.3	14.9
630														CRYSTALLINE ROCK SLIGHTLY WEATHERED TO FRESH GRANODIORITE	632.5	22.7
625																
620																
615															615.3	39.9
Boring Terminated at Elevation 615.3 ft IN CRYSTALLINE ROCK																

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-A	STATION 19+42	OFFSET 20ft LT	ALIGNMENT -L-
COLLAR ELEV. 655.2 ft	TOTAL DEPTH 39.9 ft	NORTHING 519,703	EASTING 1,495,055
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/10/09	COMP. DATE 03/10/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 8.7 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. (%)	RQD (%)		REC. (%)	RQD (%)			
	646.5										Begin Coring @ 8.7 ft	
645	646.5	8.7	1.2	1:58/1.2	(1.2)	(0.4)		(5.1)	(1.7)		CRYSTALLINE ROCK GRAY V. SLIGHTLY WEATHERED TO FRESH HARD TO V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.4 JOINTS SEMI-SMOOTH TO ROUGH	8.7
	645.3	9.9	5.0	11:12/5.0	100%	33%		82%	27%			
640	640.3	14.9	5.0	11:21/5.0	(3.9)	(1.7)		(5.1)	(0.0)		AVG. Is(50) = 25.3 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	14.9
					78%	34%		65%	0%			
635	635.3	19.9	5.0	8:24/5.0	(4.8)	(1.7)					CRYSTALLINE ROCK GRAY-BRN SEVERELY TO MODERATELY WEATHERED SOFT TO HARD GRANODIORITE W/ 0.1-0.3 JOINT SPACING (W/GRAVEL)	
					96%	34%						
630	630.3	24.9	5.0	9:24/5.0	(5.0)	(1.6)		(15.6)	(7.1)		AVG. Is(50) = 28.6 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	22.7
					100%	32%		91%	41%			
625	625.3	29.9	5.0	10:09/5.0	(4.4)	(1.4)					CRYSTALLINE ROCK GRAY SLIGHTLY WEATHERED TO FRESH HARD TO V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 2.5	
					88%	28%						
620	620.3	34.9	5.0	8:54/5.0	(4.1)	(2.4)						
					82%	48%						
615	615.3	39.9										
Boring Terminated at Elevation 615.3 ft IN CRYSTALLINE ROCK												

NCDOT BORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT 04/22/09

NCDOT CORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT 04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-C	STATION 19+48	OFFSET 11ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 39.9 ft	NORTHING 519,722	EASTING 1,495,081
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/05/09	COMP. DATE 03/05/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.5 ft

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				
660													GROUND SURFACE	0.0
658.8													ROADWAY EMBANKMENT RED-BRN MED. STIFF TO SOFT MOIST CLAYEY SANDY SILT (A-4)	
655	654.4	4.4	2	2	1							M	ALLUVIAL GRY-BRN SOFT TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	6.0
650	649.4	9.4	1	2	4							SS-6 M	RESIDUAL GRAY-BRN MED. STIFF MOIST TO WET CLAYEY SANDY SILT (A-4)	11.5
645													WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	12.5
640													CRYSTALLINE ROCK SLIGHTLY WEATHERED TO FRESH GRANODIORITE	
635														
630														
625														
620														
615														
610														
605														
600														
595														
590														
585														
580														
575														
570														

NCDOT BORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT 04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-C	STATION 19+48	OFFSET 11ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 39.9 ft	NORTHING 519,722	EASTING 1,495,081
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/05/09	COMP. DATE 03/05/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.5 ft
CORE SIZE NQ		TOTAL RUN 27.4 ft	DRILLER Smith, C. L.

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 (%)			
	646.3										Begin Coring @ 12.5 ft	
645	646.3	12.5	2.4	05:01/2.4	(2.4)	(0.7)		(16.9)	(4.8)		CRYSTALLINE ROCK	12.5
	643.9	14.9	5.0	12:48/5.0	(4.7)	(1.4)		97%	28%		GRAY SLIGHTLY WEATHERED TO FRESH V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.3 JOINTS TYPICALLY SMOOTH SOFT TO MED. HARD SEVERELY WEATHERED SEAM FROM 14.9-15.1'	
640	638.9	19.9	5.0	12:00/5.0	(4.9)	(1.4)					AVG. Is(50) = 24.2 KSF DIAMETRIAL R1=4, R2=3, R3=10, R4=6, R5=4, RMR=27 ROCK TYPE E	
635	633.9	24.9	5.0	11:39/5.0	(4.9)	(0.6)						
630	628.9	29.9	5.0		(4.0)	(0.0)		(5.9)	(0.0)		CRYSTALLINE ROCK	29.9
					80%	0%		70%	0%		BRN-GRAY COMPLETELY TO MODERATELY WEATHERED V. SOFT TO MODERATELY HARD GRANODIORITE W/ AVG. JOINT SPACING OF <0.1	
625	623.9	34.9	5.0		(3.3)	(1.5)					AVG. Is(50) = N/A	
620	618.9	39.9			66%	29%		(1.6)	(1.5)		CRYSTALLINE ROCK	38.3
					100%	94%					GRAY FRESH V. HARD GRANODIORITE (TWO SOLID PIECES) W/ AVG. JOINT SPACING OF 0.7	39.9
615											AVG. Is(50) = 21.1 KSF DIAMETRIAL R1=4, R2=3, R3=10, R4=6, R5=4, RMR=27 ROCK TYPE E	
											Boring Terminated at Elevation 618.9 ft IN CRYSTALLINE ROCK	

NCDOT CORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT_GDT 04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 19+49	OFFSET 25ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 44.9 ft	NORTHING 519,728	EASTING 1,495,094
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/06/09	COMP. DATE 03/06/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 15.6 ft

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						
660														658.8	GROUND SURFACE	0.0
655	654.5	4.3												652.8	ROADWAY EMBANKMENT RED-BRN MED. STIFF TO SOFT MOIST CLAYEY SANDY SILT (A-4)	6.0
650	649.5	9.3	1	2	1									646.7	ALLUVIAL GRAY-BRN SOFT TO STIFF MOIST CLAYEY SANDY SILT (A-4)	12.1
645	644.5	14.3	1	2	3									644.5	RESIDUAL GRAY BRN STIFF MOIST CLAYEY SANDY SILT (A-4)	14.3
640														643.2	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	15.6
635															CRYSTALLINE ROCK MODERATELY SEVERELY TO V. SLIGHTLY WEATHERED GRANODIORITE	
630														633.9	CRYSTALLINE ROCK SEVERELY WEATHERED TO FRESH GRANODIORITE	24.9
625																
620																
615														613.9		44.9
Boring Terminated at Elevation 613.9 ft IN CRYSTALLINE ROCK																

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 19+49	OFFSET 25ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 44.9 ft	NORTHING 519,728	EASTING 1,495,094
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/06/09	COMP. DATE 03/06/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 15.6 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. (%)	RQD (%)		REC. (%)	RQD (%)			
	643.2										Begin Coring @ 15.6 ft	
640	643.2	15.6	4.3	13:04/4.3	(4.1)	(1.1)		(8.8)	(2.0)		CRYSTALLINE ROCK GRAY-WHITE-BRN MODERATELY SEVERELY TO V. SLIGHTLY WEATHERED MED. HARD TO V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.3 JOINTS SMOOTH TO ROUGH (MOSTLY SMOOTH)	15.6
635	638.9	19.9	5.0	13:21/5.0	(4.7)	(0.9)					AVG. Is(50) = 18.7 KSF DIAMETRIAL R1=0, R2=3, R3=10, R4=6, R5=4, RMR=23 ROCK TYPE E	24.9
630	633.9	24.9	5.0	15:30/5.0	(4.8)	(0.5)		(18.0)	(3.4)		CRYSTALLINE ROCK GRAY-BRN SEVERELY WEATHERED TO FRESH SOFT TO V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.45 JOINTS MOSTLY SMOOTH	24.9
625	628.9	29.9	5.0	13:09/5.0	(4.4)	(1.2)					AVG. Is(50) = 17.0 KSF DIAMETRIAL R1=0, R2=3, R3=10, R4=6, R5=4, RMR=23 ROCK TYPE E	
620	623.9	34.9	5.0	12:21/5.0	(3.8)	(0.0)						
615	618.9	39.9	5.0	10:18/5.0	(5.0)	(1.2)						
610	613.9	44.9									Boring Terminated at Elevation 613.9 ft IN CRYSTALLINE ROCK	44.9

NCDOT CORE SINGLE B3677 GEO_BH_BRDG0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09

NCDOT BORE SINGLE B3677 GEO_BH_BRDG0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B2-C	STATION 20+00	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.6 ft	TOTAL DEPTH 40.0 ft	NORTHING 519,769	EASTING 1,495,060
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/04/09	COMP. DATE 03/04/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.7 ft

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				
660													GROUND SURFACE	0.0
655	654.3	4.3											ROADWAY EMBANKMENT RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	
650	649.3	9.3	1	2	2								ALLUVIAL BRN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.3
645	644.3	14.3											RESIDUAL BRN-GRAY-WHITE STIFF MOIST CLAYEY SANDY SILT (A-4) W/ QUARTZ GRAVEL NEAR BOTTOM	11.8
640	639.3	19.3	9	12	66						SS-3	M	WEATHERED ROCK SEVERLY WEATHERED CRYSTALLINE ROCK	15.3
635			38	62/0.3									CRYSTALLINE ROCK MODERATELY SEVERELY WEATHERED TO FRESH GRANODIORITE	20.7
630													CRYSTALLINE ROCK FRESH GRANODIORITE	20.7
625														30.0
620														40.0
615													Boring Terminated at Elevation 618.6 ft IN CRYSTALLINE ROCK	40.0

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B2-C	STATION 20+00	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.6 ft	TOTAL DEPTH 40.0 ft	NORTHING 519,769	EASTING 1,495,060
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/04/09	COMP. DATE 03/04/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.7 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. (%)	RQD (%)		REC. (%)	RQD (%)			
	637.9										Begin Coring @ 20.7 ft	
635	637.9	20.7	4.3	9:07/4.3	(1.5)	(0.0)		(3.0)	(1.1)		CRYSTALLINE ROCK GRAY MODERATELY SEVERELY WEATHERED TO FRESH MODERATELY HARD TO V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.5 (BASED ON LOW RECOVERY) JOINTS SLIGHTLY ROUGH TO SMOOTH	20.7
630	633.6	25.0	5.0	12:15/5.0	(1.6)	(1.1)					AVG. Is(50) = 33.1 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	30.0
625	628.6	30.0	5.0	12:48/5.0	(4.4)	(1.8)		(9.2)	(6.1)		CRYSTALLINE ROCK GRAY FRESH V. HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.7, JOINTS SMOOTH	30.0
620	623.6	35.0	5.0	11:36/5.0	(4.8)	(4.1)					AVG. Is(50) = 31.4 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	40.0
615	618.6	40.0									Boring Terminated at Elevation 618.6 ft IN CRYSTALLINE ROCK	40.0

NCDOT BORE SINGLE B3677_GEO_BH_BRD00036_MECKLENBURG.GPJ_NC_DOT_GDT_04/22/09

NCDOT CORE SINGLE B3677_GEO_BH_BRD00036_MECKLENBURG.GPJ_NC_DOT_GDT_04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B2-B	STATION 20+05	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.7 ft	TOTAL DEPTH 34.9 ft	NORTHING 519,778	EASTING 1,495,069
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/03/09	COMP. DATE 03/03/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.5 ft

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				
660													GROUND SURFACE	0.0
655	654.4	4.3	1	2	3						SS-1	M	ROADWAY EMBANKMENT RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	
650	649.4	9.3	1	2	3						SS-2	M	ALLUVIAL BRN-GRAY MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.0
645	644.4	14.3											RESIDUAL BRN-GRAY STIFF TO V. STIFF MOIST CLAYEY SANDY SILT (A-4)	14.3
640			100/0.2							100/0.2			WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	14.5
635													CRYSTALLINE ROCK MODERATELY SEVERELY TO SLIGHTLY WEATHERED GRANODIORITE	
630													CRYSTALLINE ROCK SLIGHTLY WEATHERED TO FRESH GRANODIORITE	
625														
620														
615														
610														
605														
600														
595														
590														
585														
580														

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. B2-B	STATION 20+05	OFFSET 23ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.7 ft	TOTAL DEPTH 34.9 ft	NORTHING 519,778	EASTING 1,495,069
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT Core	HAMMER TYPE Automatic	
START DATE 03/03/09	COMP. DATE 03/03/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.5 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) %			
	644.2	14.5	0.4	12:21/5.0	(0.2)	(0.0)		(6.0)	(0.0)		Begin Coring @ 14.5 ft	
640	643.8	14.9	5.0		50%	0%		58%	0%		CRYSTALLINE ROCK GRAY MODERATELY SEVERELY TO SLIGHTLY WEATHERED MED. HARD TO VERY HARD GRANODIORITE W/ AVG. JOINT SPACING <0.1	14.5
635	638.8	19.9	5.0	10:24/5.0	(1.0)	(0.0)					AVG. Is(50) = 26.7 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	
630	633.8	24.9	5.0	21:30/5.0	(4.9)	(3.3)		(9.6)	(6.6)		CRYSTALLINE ROCK GRAY V. SLIGHTLY WEATHERED TO FRESH VERY HARD GRANODIORITE W/ AVG. JOINT SPACING OF 0.8	24.9
625	628.8	29.9	5.0		(4.7)	(3.2)					AVG. Is(50) = 28.6 KSF DIAMETRIAL R1=4, R2=8, R3=10, R4=6, R5=4, RMR=32 ROCK TYPE E	
620	623.8	34.9									Boring Terminated at Elevation 623.8 ft IN CRYSTALLINE ROCK	34.9
615												
610												
605												
600												
595												
590												
585												
580												

NCDOT BORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT.GDT 04/22/09

NCDOT CORE SINGLE B3677_GEO_BH_BRD0036_MECKLENBURG.GPJ NC_DOT.GDT 04/22/09

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. EB2-C	STATION 20+22	OFFSET 12ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.5 ft	TOTAL DEPTH 11.4 ft	NORTHING 519,789	EASTING 1,495,051
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 03/04/09	COMP. DATE 03/04/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 11.4 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
660														658.5 GROUND SURFACE	0.0
655	654.1	4.4												ROADWAY EMBANKMENT RED-BRN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	4.4
650	649.1	9.4	2	1	3						SS-4	M		ALLUVIAL RED-ORANGE MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.4
645											SS-5	M		RESIDUAL TAN-YELLOW MED. TO V. STIFF MOIST LOW (PI=13) PLASTICITY SILTY SANDY CLAY (A-6) W/ ROCK FRAGS LAST 0.5	11.0
640														WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	11.4
Boring Terminated with Casing Advancer Refusal at Elevation 647.1 ft ON CRYSTALLINE ROCK															

PROJECT NO. 33220.1.1	ID. B-3677	COUNTY Mecklenburg	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE #36 ON SR 3135 OVER IRVINS CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 20+27	OFFSET 24ft RT	ALIGNMENT -L-
COLLAR ELEV. 658.8 ft	TOTAL DEPTH 20.3 ft	NORTHING 519,799	EASTING 1,495,060
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 03/09/09	COMP. DATE 03/09/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.3 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
660														658.8 GROUND SURFACE	0.0
655	654.3	4.5												ROADWAY EMBANKMENT RED-BRN STIFF MOIST CLAYEY SANDY SILT (A-4)	4.5
650	649.3	9.5	3	4	9							M		ALLUVIAL GRAY-BRN STIFF TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	9.5
645	644.3	14.5	2	3	2							M		RESIDUAL TAN-YELLOW MED. TO V. STIFF MOIST SILTY SANDY CLAY (A-6)	14.5
640	639.3	19.5	21	52	48/0.2									WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	20.3
Boring Terminated with tricone refusal at Elevation 638.5 ft ON CRYSTALLINE ROCK															

VCDOT BORE SINGLE B3677_GEO_BH_BRDG0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09

VCDOT BORE SINGLE B3677_GEO_BH_BRDG0036_MECKLENBURG.GPJ NC_DOT_GDT_04/22/09



**FIELD
 SCOUR REPORT**

WBS: 33220.1.1 TIP: B-3677 COUNTY: Mecklenburg

DESCRIPTION(1): Bridge #36 on SR 3135 (Lebanon Rd.) over Irvins Creek

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) _____

Bridge No.: 36 Length: 40' 7" Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
 Foundation Type: Vertical abutments and timber piers

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None observed

Interior Bents: N/A

Channel Bed: None observed

Channel Bank: None observed

EXISTING SCOUR PROTECTION

Type(3): Rip Rap

Extent(4): Along drainage ditch at EB2-A, Near the wingwall, also Rip Rap along banks on downstream side

Effectiveness(5): Poor, Slope deteriorating and eroding around EB2-A wingwall

Obstructions(6): Beavers building a dam to back up water in vicinity of bridge.

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, or aggrading.
- 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): Sand (A-2-4), cobbles and rocks

Channel Bank Material(8): sandy silt (A-4)

Channel Bank Cover(9): small trees, shrubs and grass

Floodplain Width(10): appx. 150'

Floodplain Cover(11): Grass

Stream is(12): Aggrading _____ Degrading _____ Undetermined

Channel Migration Tendency(13): Slim to none

Observations and Other Comments: Single span bridge

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

B1	B2										
642	639										

Comparison of DSE to Hydraulics Unit theoretical scour:

Bent 1 - Geotechnical adjusted scour raised to 642'. Original Hydro DSE was 637'.

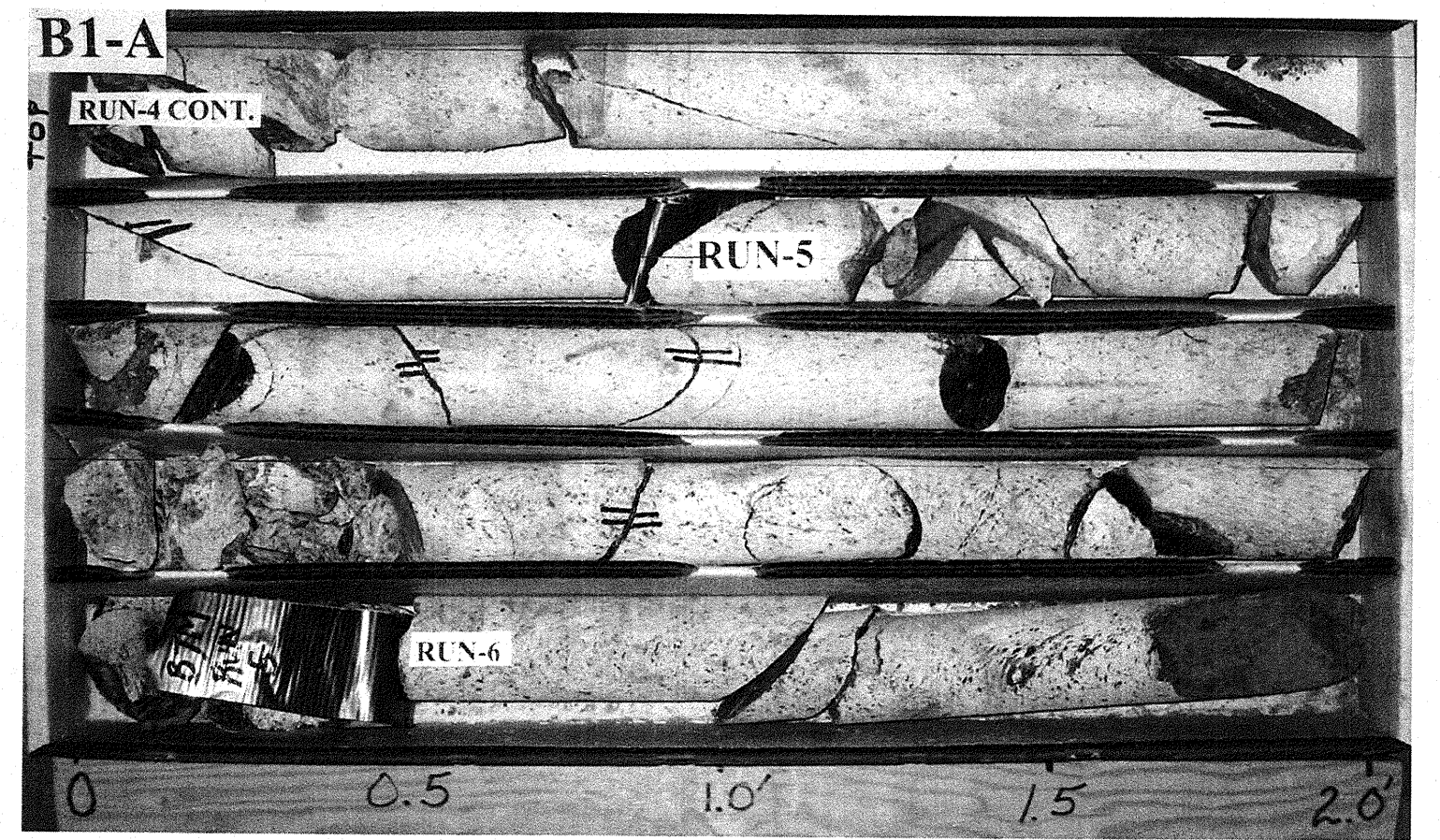
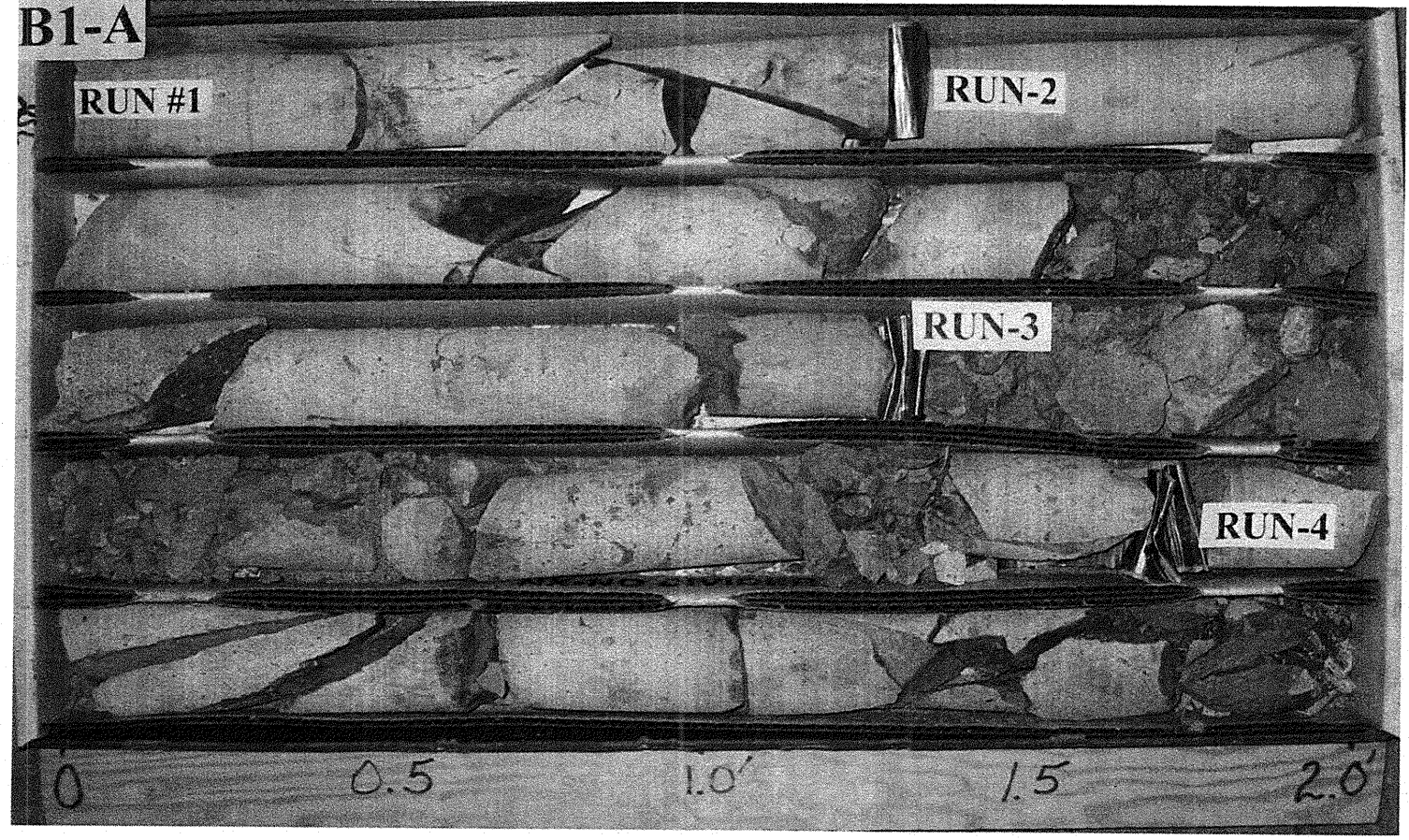
Bent 2- Geotechnical adjusted scour raised to 639'. Original Hydro DSE was 636'.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank									
Sample No.									
Retained #4									
Passed #10									
Passed #40									
Passed #200									
Coarse Sand									
Fine Sand									
Silt									
Clay									
LL									
PI									
AASHTO									
Station									
Offset									
Depth									

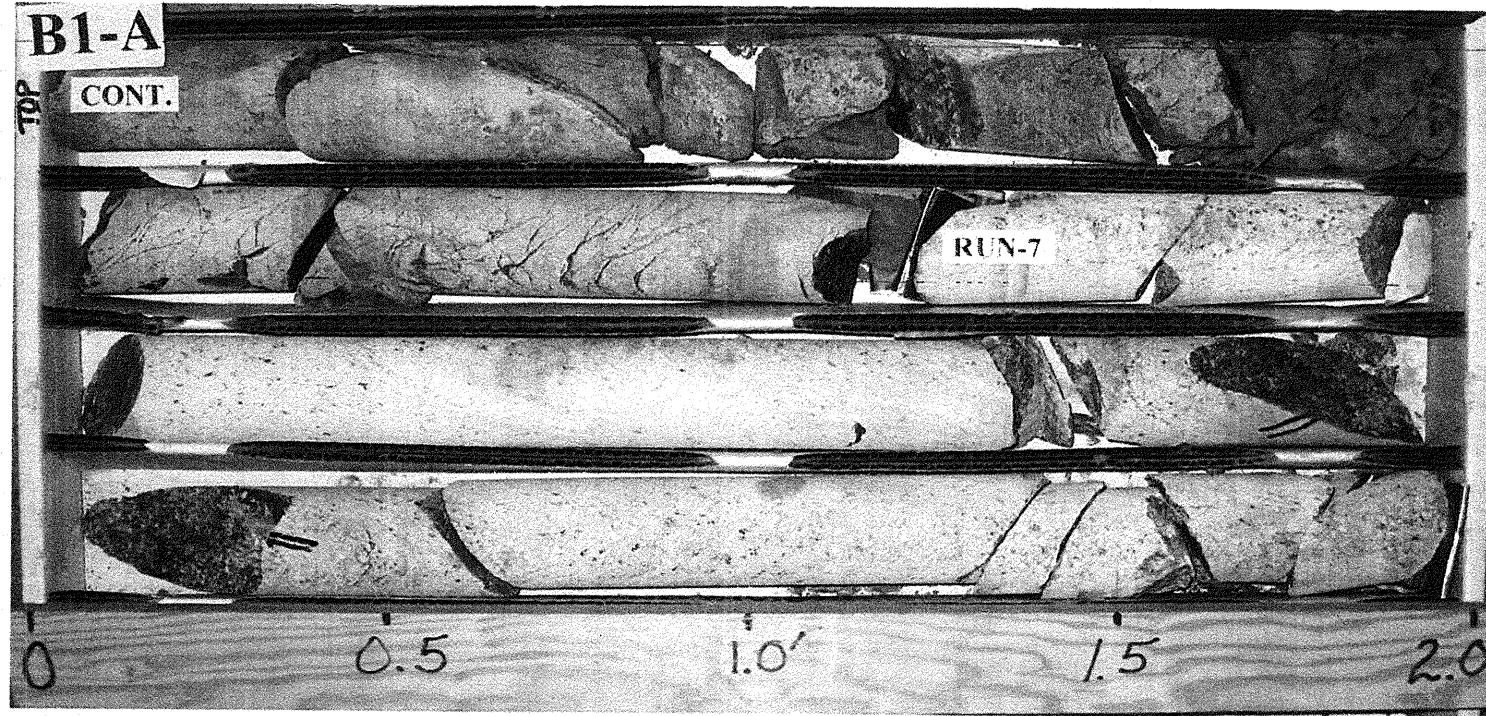
33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



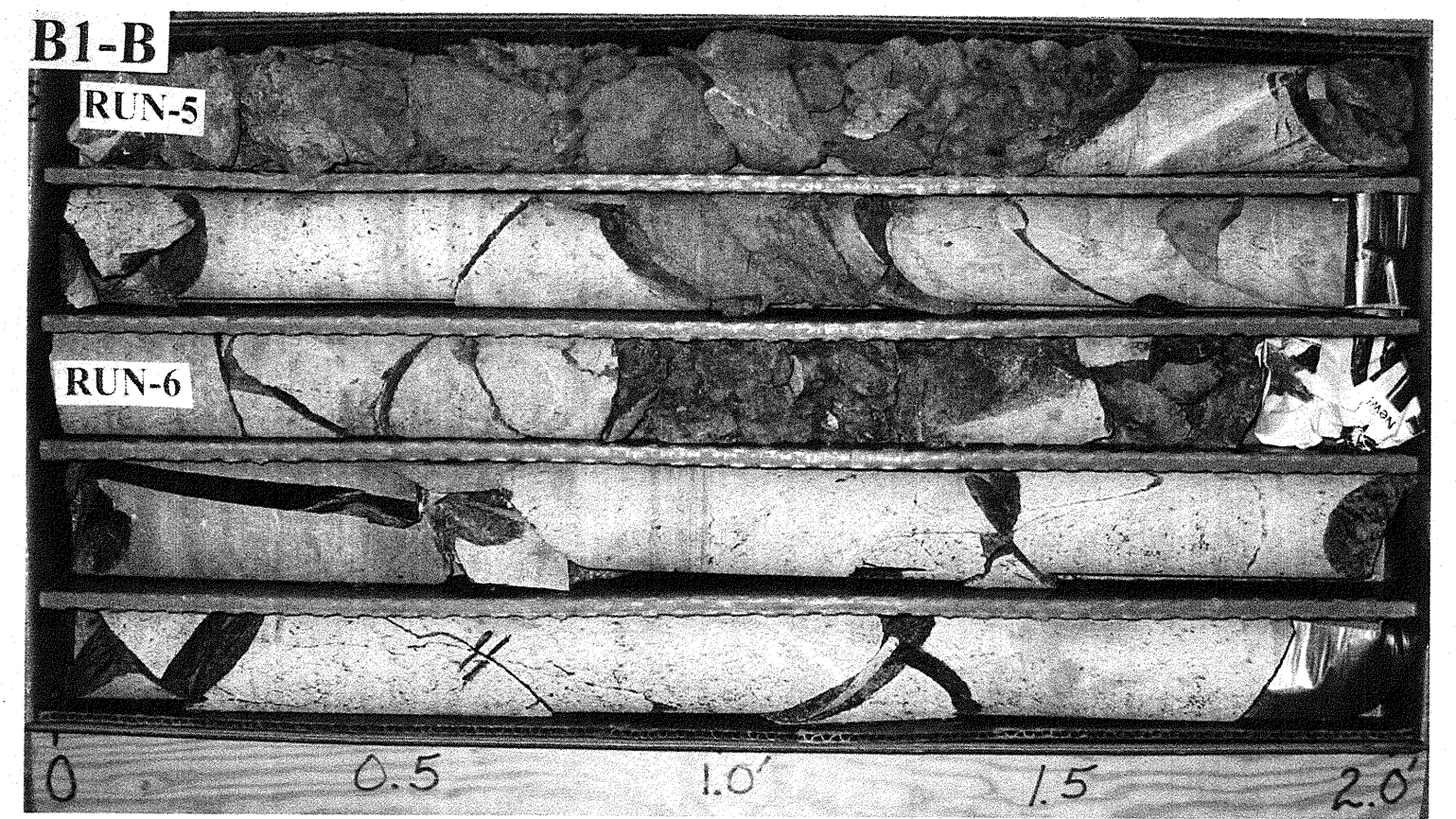
33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



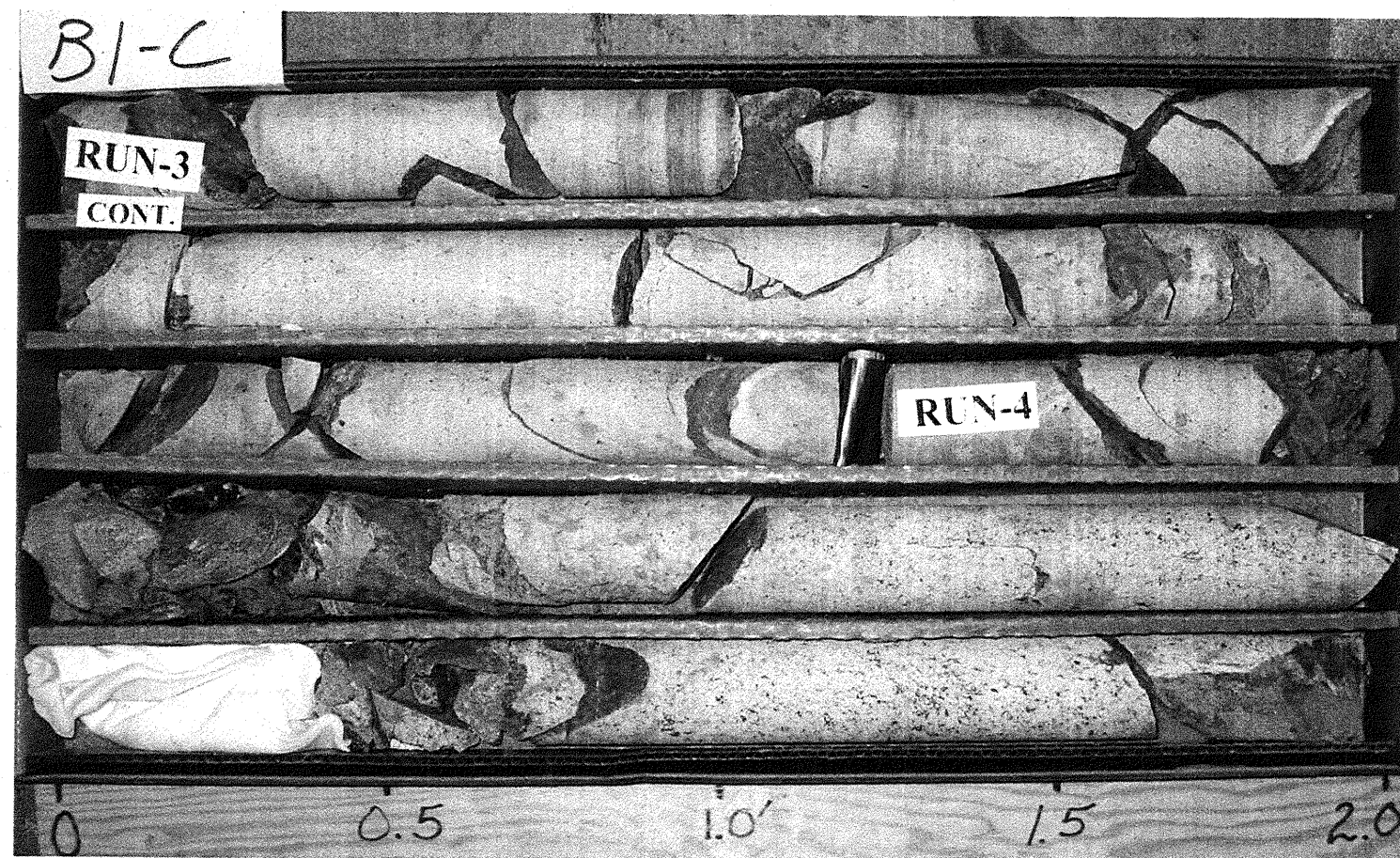
33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



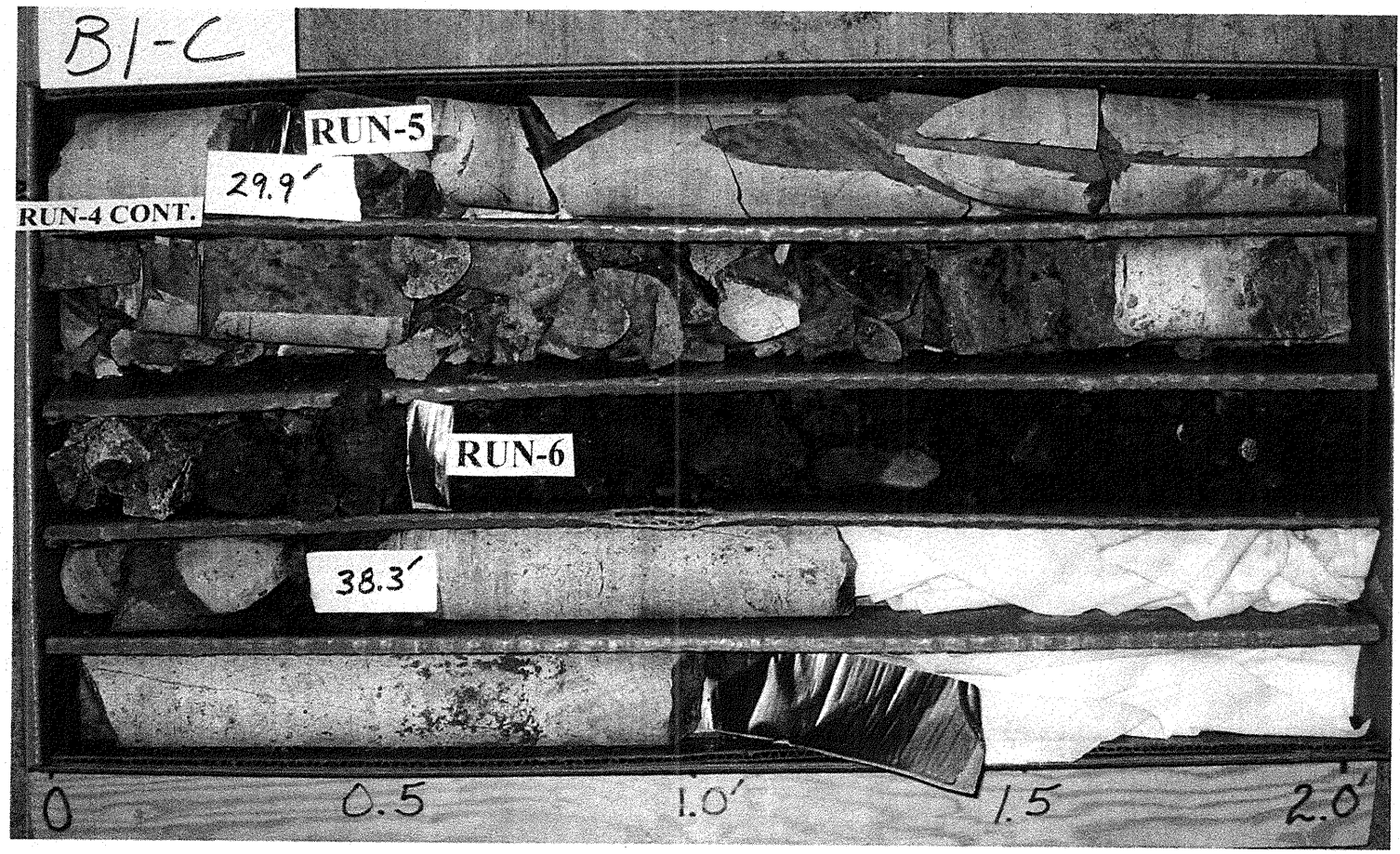
33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



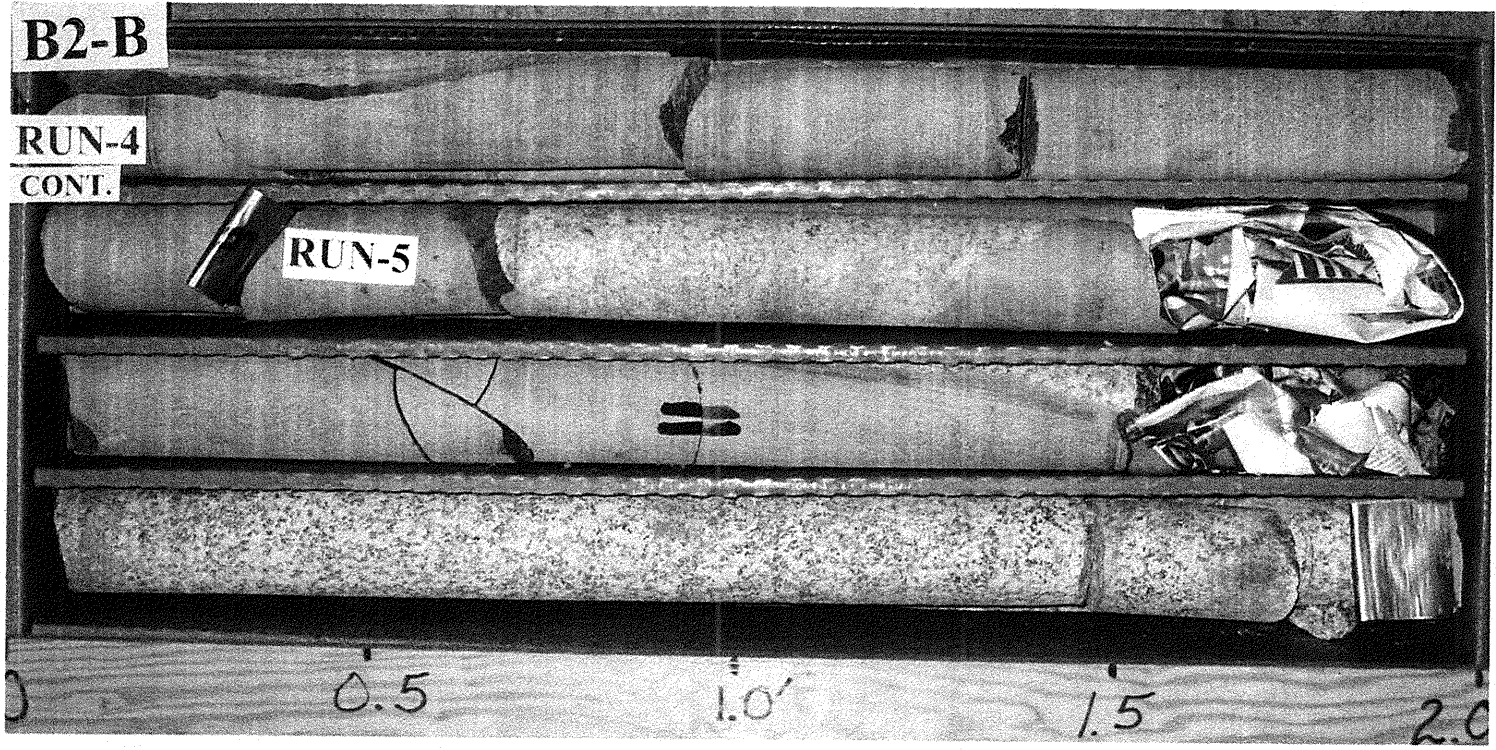
33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



33220.1.1 (B-3677)
MECKLENBURG COUNTY
BRIDGE #36 OVER IRVINS CREEK ON SR 3135

CORE
PHOTOS



33220.1.1 (B-3677)
Mecklenburg County
Bridge #36 on Lebanon Rd. (SR 3135) over Irvins Creek

Site Photos

