STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33818.1.1 (B-4652)	1	28

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33818.1.1 (B-4652) F.A. PROJ. BRZ-1937(2)

COUNTY UNION

PROJECT DESCRIPTION BRIDGE NO. 118 OVER LANES CREEK ON SR 1937 (AUSTIN ROAD) BETWEEN SR 1915 AND SR 1941

SITE DESCRIPTION

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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.

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INVESTIGATED BY C. B. LITTLE

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE APRIL 2010

NORTH CAROLINA LICENSED SEAL 4015 GEOLOGIST C. B. LITTLE

PROJECT: 33818.1.1

ID: B-4652

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 IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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PROJECT REFERENCE NO.	SHEET NO.
33818.1.1 (B-4652)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING # 10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	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
GRAIN SIZE IN.: 12 | 3

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	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

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.

GRADATION

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.

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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

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
- 25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- SPT N-VALUE
- REF SPT REFUSAL
- TEST W/ CORE BORING

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
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE ____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NO/NQ
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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 YEILD 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. *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.

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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

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.

TERMS AND DEFINITIONS

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.

BENCH MARK: BM #2 -L- STA. 23+59.45 101.31' LT -BL- STA 13+32 84' LT

ELEVATION: 465.04 FT.

NOTES:

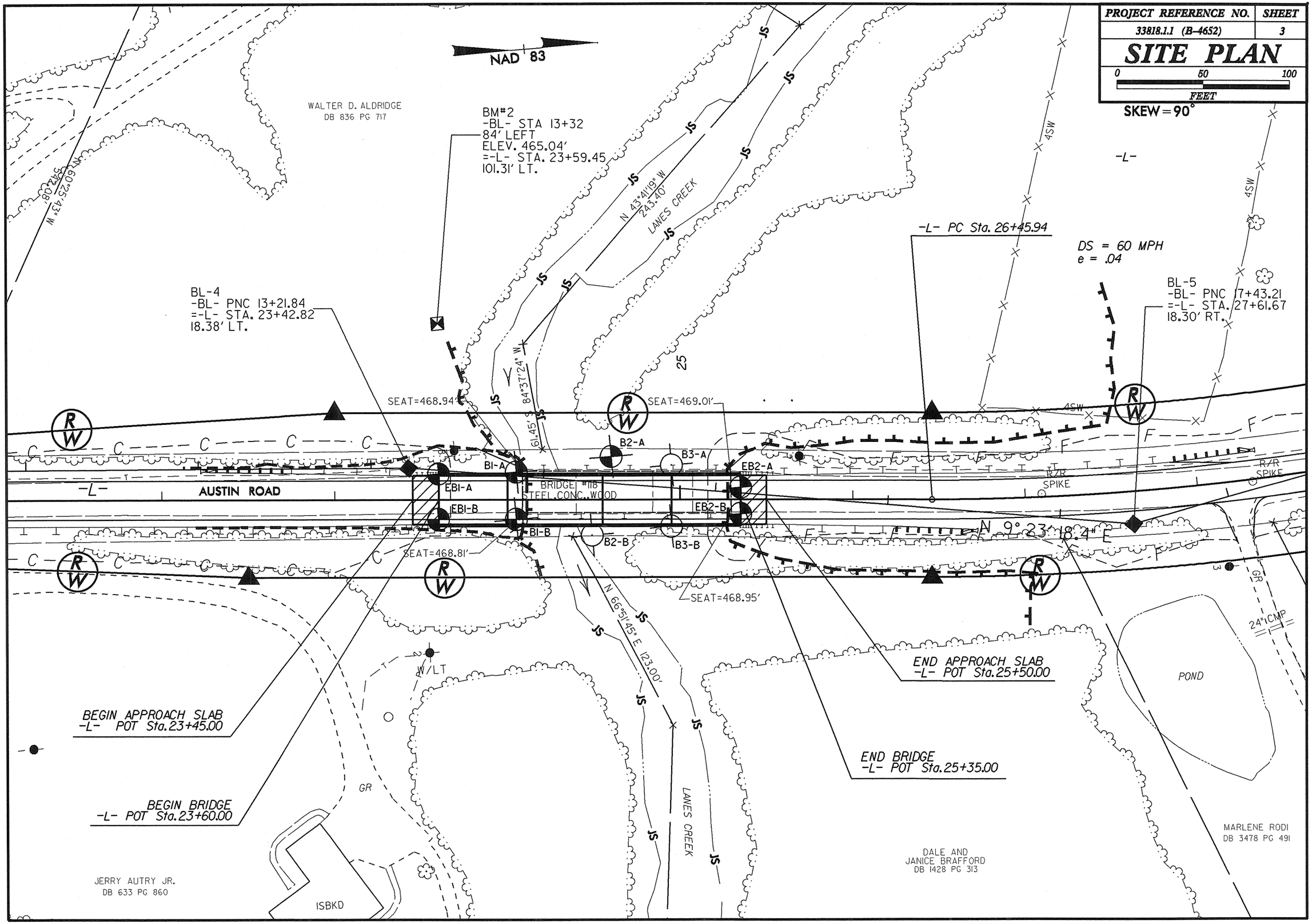
REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	3

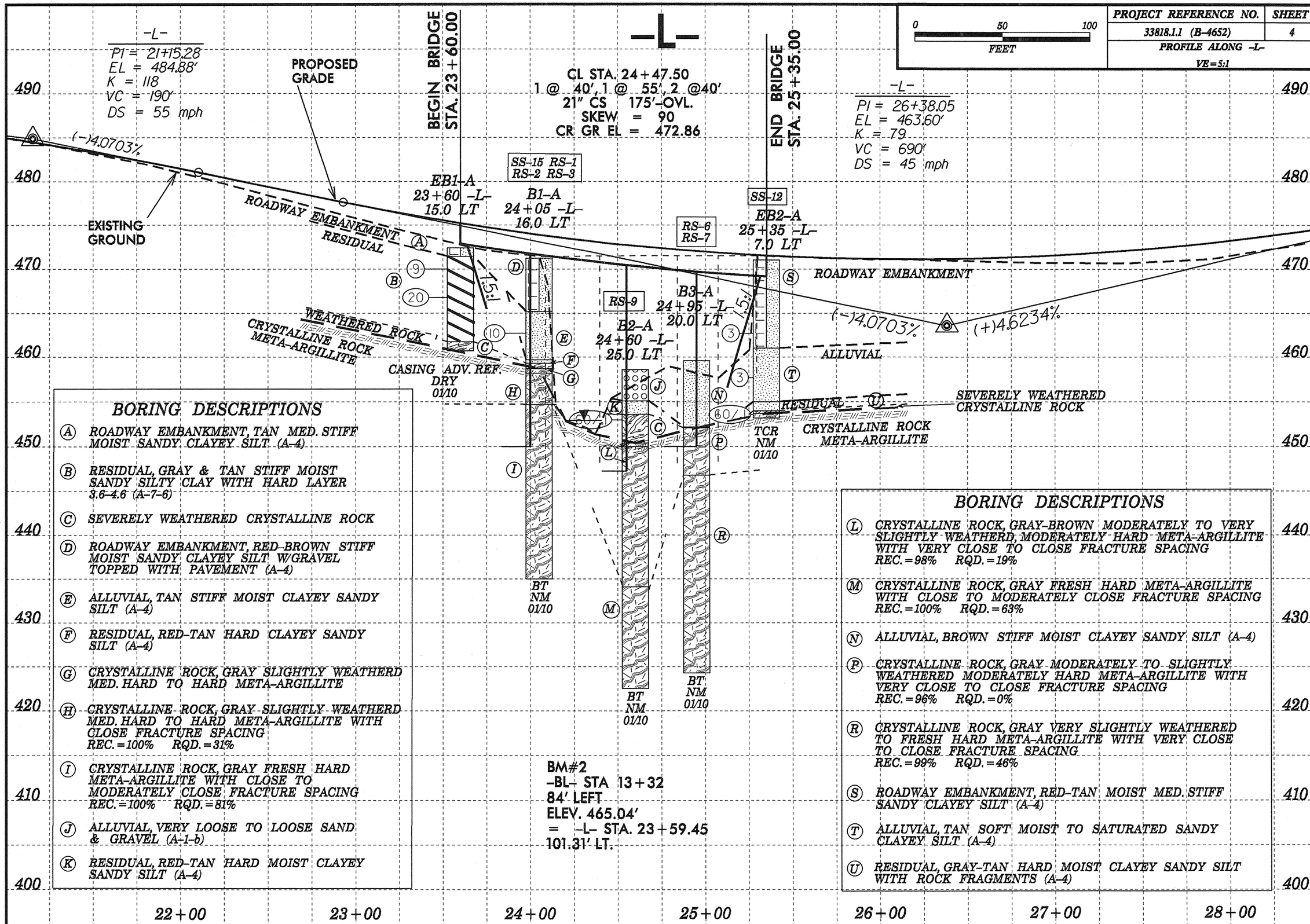
SITE PLAN

0 50 100
FEET

SKEW = 90°



PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	4
PROFILE ALONG -L-	
VE=5:1	



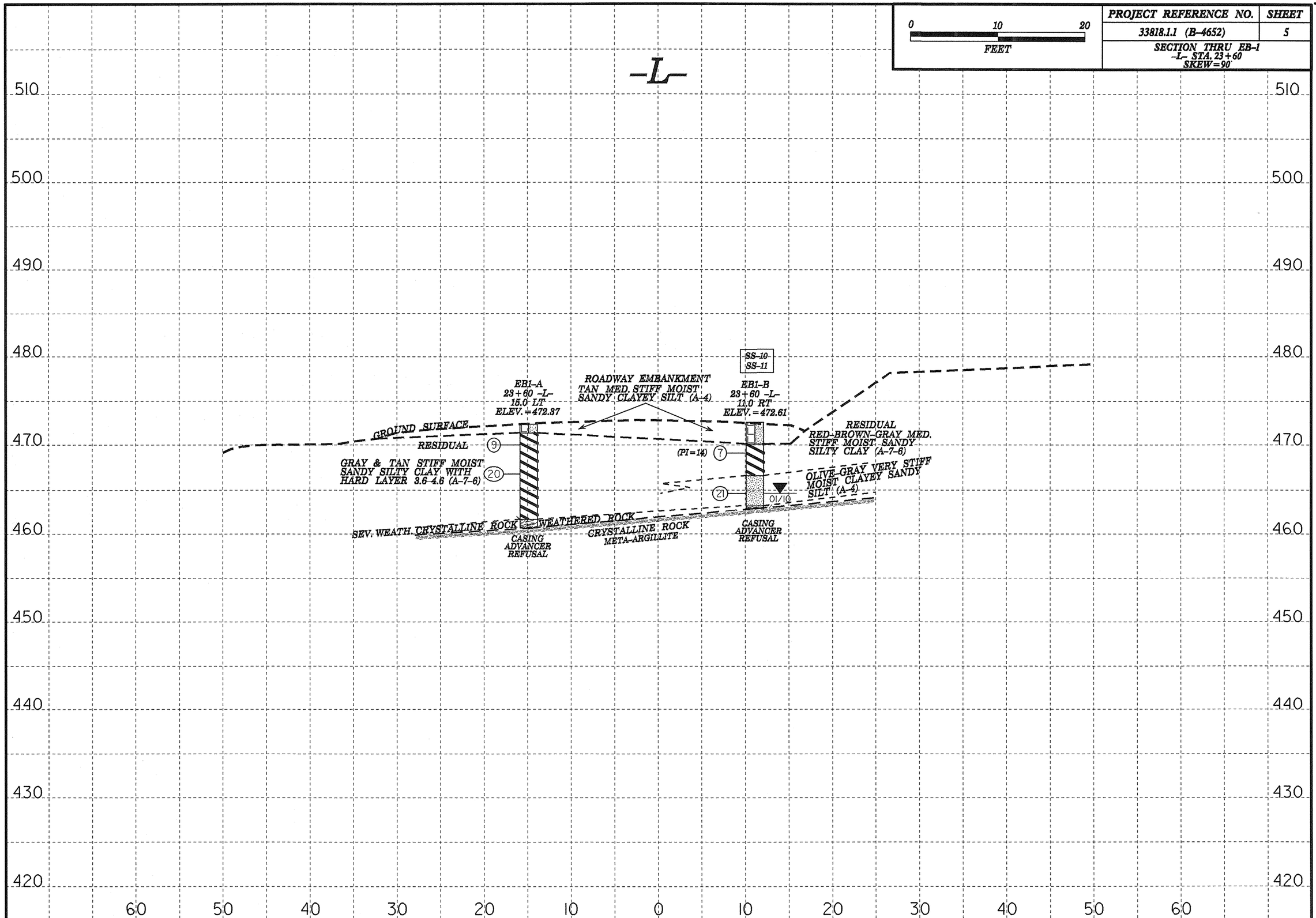
BORING DESCRIPTIONS

- (A) ROADWAY EMBANKMENT, TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)
- (B) RESIDUAL, GRAY & TAN STIFF MOIST SANDY SILTY CLAY WITH HARD LAYER 3.6-4.6 (A-7-6)
- (C) SEVERELY WEATHERED CRYSTALLINE ROCK
- (D) ROADWAY EMBANKMENT, RED-BROWN STIFF MOIST SANDY CLAYEY SILT W/GRAVEL TOPPED WITH PAVEMENT (A-4)
- (E) ALLUVIAL, TAN STIFF MOIST CLAYEY SANDY SILT (A-4)
- (F) RESIDUAL, RED-TAN HARD CLAYEY SANDY SILT (A-4)
- (G) CRYSTALLINE ROCK, GRAY SLIGHTLY WEATHERD MED. HARD TO HARD META-ARGILLITE
- (H) CRYSTALLINE ROCK, GRAY SLIGHTLY WEATHERD MED. HARD TO HARD META-ARGILLITE WITH CLOSE FRACTURE SPACING REC.=100% RQD.=31%
- (I) CRYSTALLINE ROCK, GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING REC.=100% RQD.=81%
- (J) ALLUVIAL, VERY LOOSE TO LOOSE SAND & GRAVEL (A-1-b)
- (K) RESIDUAL, RED-TAN HARD MOIST CLAYEY SANDY SILT (A-4)

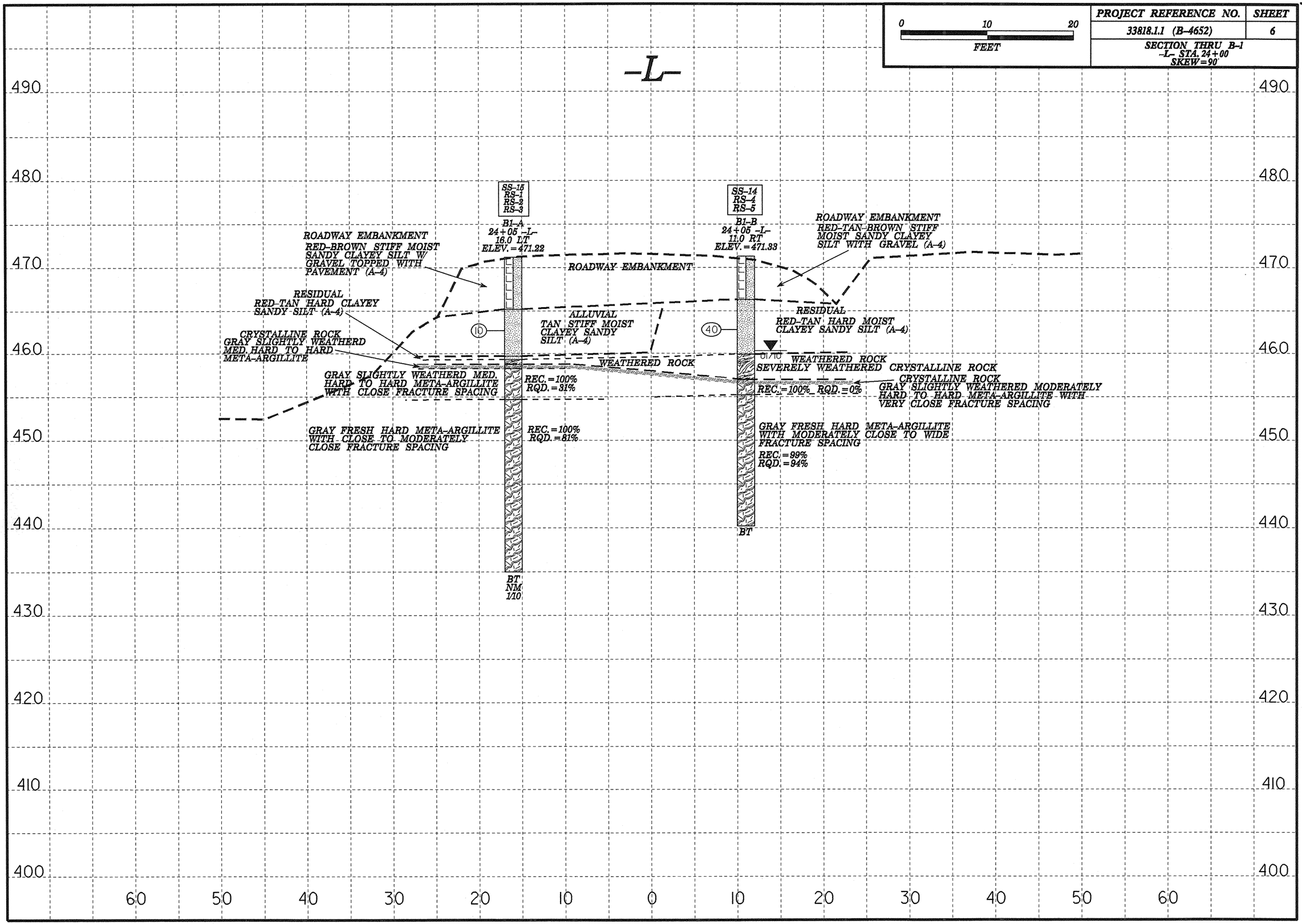
BORING DESCRIPTIONS

- (L) CRYSTALLINE ROCK, GRAY-BROWN MODERATELY TO VERY SLIGHTLY WEATHERD, MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING REC.=98% RQD.=19%
- (M) CRYSTALLINE ROCK, GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING REC.=100% RQD.=63%
- (N) ALLUVIAL, BROWN STIFF MOIST CLAYEY SANDY SILT (A-4)
- (P) CRYSTALLINE ROCK, GRAY MODERATELY TO SLIGHTLY WEATHERED MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING REC.=96% RQD.=0%
- (R) CRYSTALLINE ROCK, GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING REC.=99% RQD.=46%
- (S) ROADWAY EMBANKMENT, RED-TAN MOIST MED. STIFF SANDY CLAYEY SILT (A-4)
- (T) ALLUVIAL, TAN SOFT MOIST TO SATURATED SANDY CLAYEY SILT (A-4)
- (U) RESIDUAL, GRAY-TAN HARD MOIST CLAYEY SANDY SILT WITH ROCK FRAGMENTS (A-4)

PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	5
SECTION THRU EB-1 -L- STA. 23+60 SKEW=90	

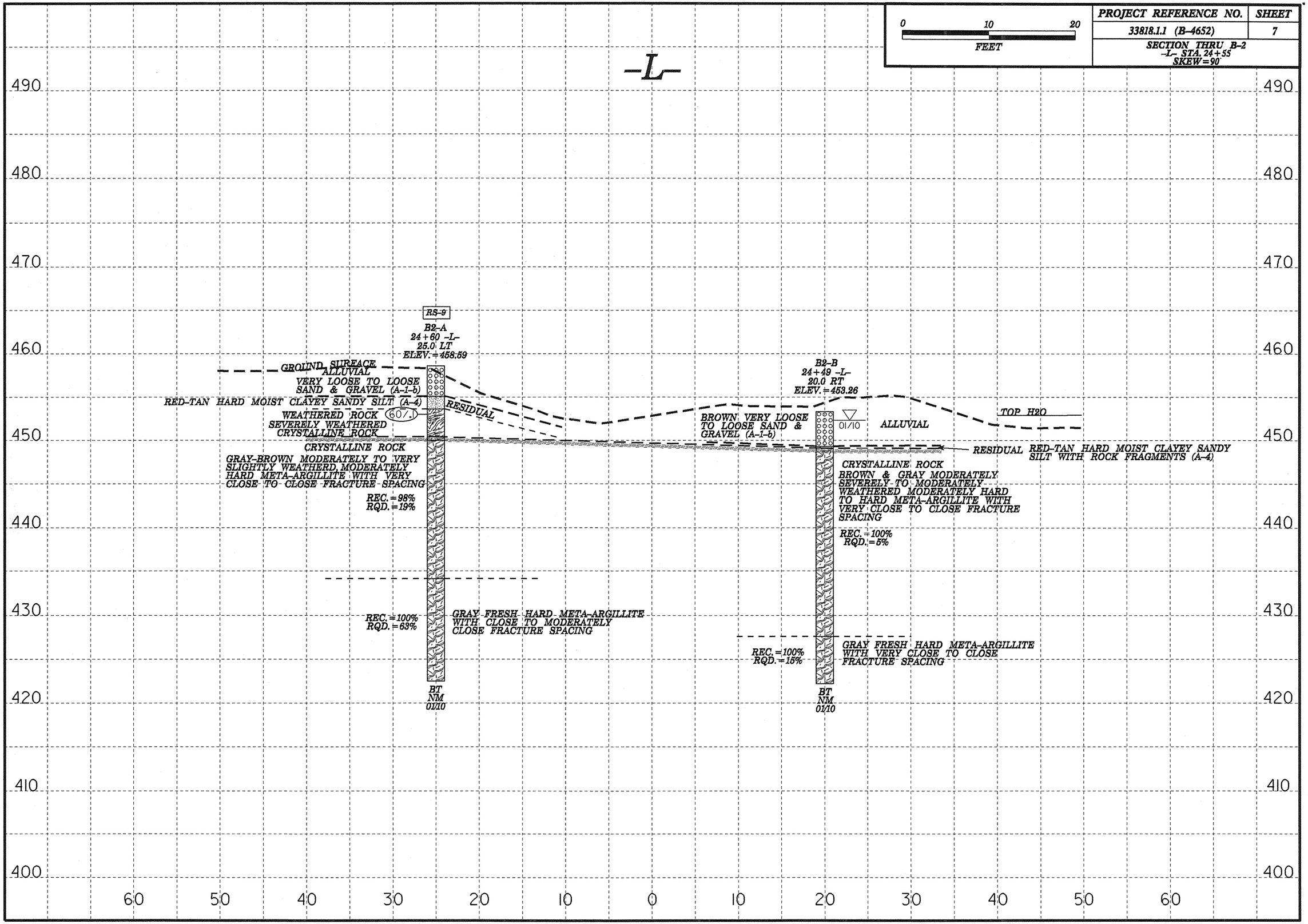


PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	6
SECTION THRU B-1 -L- STA. 24+00 SKEW=90°	

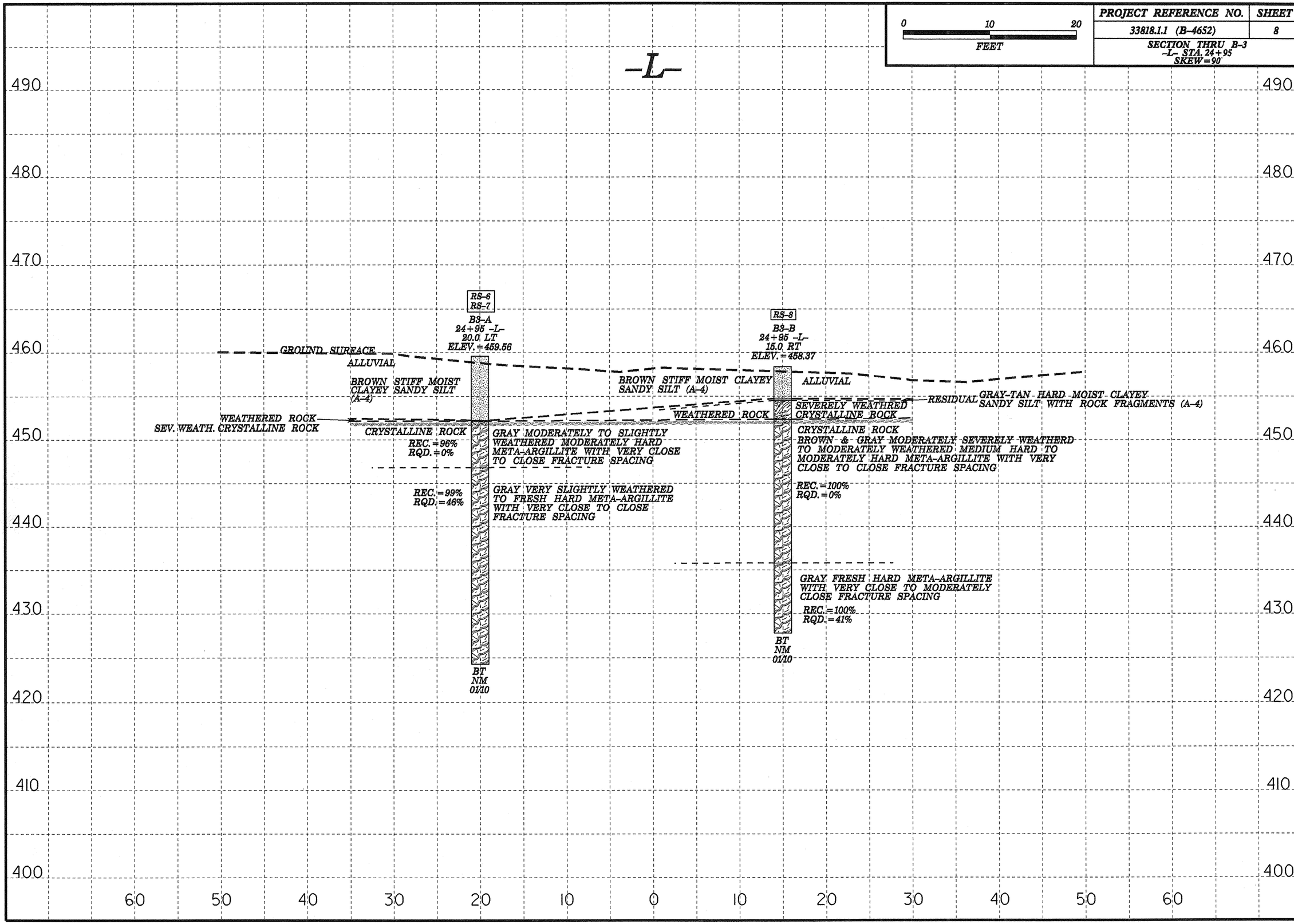


PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	7

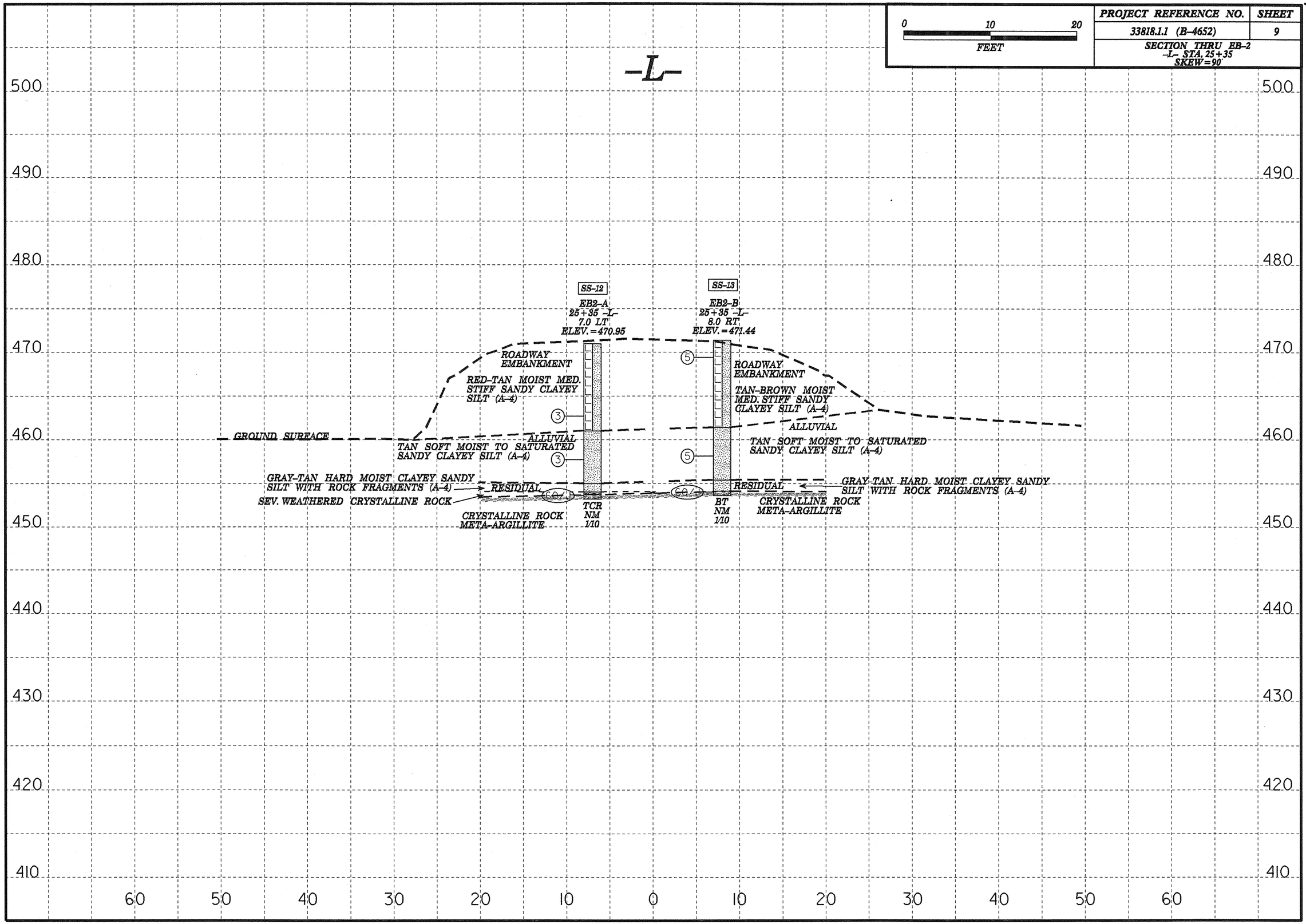
SECTION THRU B-2
-L- STA. 24+55
SKEW=90°



PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	8
SECTION THRU B-3 -L- STA. 24+95 SKEW=90°	



PROJECT REFERENCE NO.	SHEET
33818.1.1 (B-4652)	9
SECTION THRU EB-2 -L- STA. 25+35 SKEW=90°	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.	
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 23+60	**OFFSET** 15 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 472.4 ft	**TOTAL DEPTH** 11.7 ft	**NORTHING** 411,475	**EASTING** 1,579,064	**24 HR.** Dry
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 01/25/10	**COMP. DATE** 01/25/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
										472.4 GROUND SURFACE	0.0
	471.0	1.4								471.4 **ROADWAY EMBANKMENT** TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)	1.0
470			4	4	5	9		M			
	467.8	4.6								**RESIDUAL** GRAY & TAN STIFF MOIST SANDY SILTY CLAY WITH HARD LAYER 3.6-4.6 (A-7-6)	
			8	8	12	20		M			
465											
										461.7	10.7
										460.7 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	11.7
460										Boring Terminated with Casing Advancer Refusal at Elevation 460.7 ft on meta-argillite	
455											
450											
445											
440											
435											
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.	
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 23+60	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 472.6 ft	**TOTAL DEPTH** 9.7 ft	**NORTHING** 411,472	**EASTING** 1,579,090	**24 HR.** 8.0
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 01/25/10	**COMP. DATE** 01/25/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
										472.6 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
470	470.1	2.5	3	3	4	7	SS-10	M		470.1 TAN MED. STIFF MOIST SANDY CLAYEY SILT (A-4)	2.5
										RESIDUAL RED-BROWN-GRAY MED. STIFF MOIST (PI=14) SANDY SILTY CLAY (A-7-6)	
465	465.6	7.0	8	9	12	21	SS-11	M		466.6	6.0
										RESIDUAL OLIVE-GRAY VERY STIFF MOIST CLAYEY SANDY SILT (A-4)	
										463.2	9.4
										462.9 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	9.7
460										Boring Terminated with Casing Advancer Refusal at Elevation 462.9 ft on meta-argillite	
455											
450											
445											
440											
435											
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 24+05	**OFFSET** 16 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 471.2 ft	**TOTAL DEPTH** 36.2 ft	**NORTHING** 411,520	**EASTING** 1,579,067
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	NM
24 HR.	NM

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
										471.2 GROUND SURFACE	0.0
470								M		**ROADWAY EMBANKMENT** RED-BROWN STIFF MOIST SANDY CLAYEY SILT W/ GRAVEL TOPPED WITH PAVEMENT (A-4)	
465										465.2	6.0
	463.7	7.5	4	5	5	10	SS-15	M		**ALLUVIAL** TAN STIFF MOIST CLAYEY SANDY SILT (A-4)	
460										459.7	11.5
										459.3 **RESIDUAL** RED-TAN HARD CLAYEY SANDY SILT (A-4)	11.9
										458.7	12.5
										458.2	13.0
455										454.7 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	16.5
							RS-1			**CRYSTALLINE ROCK** GRAY SLIGHTLY WEATHERD MED. HARD TO HARD META-ARGILLITE	
450										**CRYSTALLINE ROCK** GRAY SLIGHTLY WEATHERD MED. HARD TO HARD META-ARGILLITE WITH CLOSE FRACTURE SPACING	
445							RS-2			**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING	
440											
435							RS-3			435.0	36.2
										Boring Terminated at Elevation 435.0 ft in meta-argillite	
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 04/01/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 11

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 24+05	**OFFSET** 16 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 471.2 ft	**TOTAL DEPTH** 36.2 ft	**NORTHING** 411,520	**EASTING** 1,579,067
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/28/10	**COMP. DATE** 01/28/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NO/NQ	**TOTAL RUN** 23.2 ft		

GROUND WTR (ft)	
0 HR.	NM
24 HR.	NM

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
458.2											Begin Coring @ 13.0 ft	
	458.2	13.0	3.2		(3.2) 100%	(1.1) 34%		(3.5) 100%	(1.1) 31%		458.2 **CRYSTALLINE ROCK** GRAY SLIGHTLY WEATHERD MED. HARD TO HARD META-ARGILLITE WITH CLOSE FRACTURE SPACING (RUN 1) AVERAGE FRACTURE SPACING = 0.4'	13.0
455	455.0	16.2									454.7	16.5
			5.0		(5.0) 100%	(4.0) 80%	RS-1	(19.7) 100%	(16.0) 81%		**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING (RUN 2) AVERAGE FRACTURE SPACING = 1.7' (RUN 3) AVERAGE FRACTURE SPACING = 1.7' (RUN 4) AVERAGE FRACTURE SPACING = 1.3'	
450	450.0	21.2										
			5.0		(5.0) 100%	(4.5) 90%	RS-2					
445	445.0	26.2										
			5.0		(5.0) 100%	(3.9) 78%						
440	440.0	31.2										
			5.0		(5.0) 100%	(3.4) 67%	RS-3					
435	435.0	36.2									435.0	36.2
											Boring Terminated at Elevation 435.0 ft in meta-argillite	
430												
425												
420												
415												
410												
405												
400												
395												
390												
385												
380												

NCDOT CORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 04/01/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	ID. B-4652	COUNTY UNION	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			GROUND WTR (ft)
BORING NO. B1-B	STATION 24+05	OFFSET 11 ft RT	ALIGNMENT -L- — 0 HR. NM
COLLAR ELEV. 471.3 ft	TOTAL DEPTH 31.1 ft	NORTHING 411,517	EASTING 1,579,094 — 24 HR. 11.0
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 01/27/10	COMP. DATE 01/27/10	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
										471.3 GROUND SURFACE	0.0
470										**ROADWAY EMBANKMENT** RED-TAN-BROWN STIFF MOIST SANDY CLAYEY SILT WITH GRAVEL (A-4)	
										466.3	5.0
465	463.8	7.5								**RESIDUAL** RED-TAN HARD MOIST CLAYEY SANDY SILT (A-4)	
			14	18	22	40	SS-14				
460										459.9	11.4
										WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	
										456.9	14.4
455										455.2 **CRYSTALLINE ROCK** GRAY SLIGHTLY WEATHERED MODERATELY HARD TO HARD META-ARGILLITE WITH VERY CLOSE FRACTURE SPACING	16.1
							RS-4				
450										**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH MODERATELY CLOSE TO WIDE FRACTURE SPACING	
445							RS-5				
440										440.2	31.1
										Boring Terminated at Elevation 440.2 ft in meta-argillite	
435											
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 1a

PROJECT NO. 33818.1.1	ID. B-4652	COUNTY UNION	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			GROUND WTR (ft)
BORING NO. B1-B	STATION 24+05	OFFSET 11 ft RT	ALIGNMENT -L- — 0 HR. NM
COLLAR ELEV. 471.3 ft	TOTAL DEPTH 31.1 ft	NORTHING 411,517	EASTING 1,579,094 — 24 HR. 11.0
DRILL MACHINE CME-550X	DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 01/27/10	COMP. DATE 01/27/10	SURFACE WATER DEPTH N/A
CORE SIZE NO/NQ	TOTAL RUN 16.7 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
456.9											Begin Coring @ 14.4 ft	
455	456.9 455.2	14.4 16.1	1.7		(1.7) 100%	(0.0) 0%		(1.7) 100%	(0.0) 0%		456.9 455.2 **CRYSTALLINE ROCK** GRAY SLIGHTLY WEATHERED MODERATELY HARD TO HARD META-ARGILLITE WITH VERY CLOSE FRACTURE SPACING (RUN 1) AVERAGE FRACTURE SPACING = 0.17'	14.4 16.1
			5.0		(5.0) 100%	(4.8) 95%	RS-4	(14.8) 99%	(14.1) 94%			
450	450.2	21.1									**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH MODERATELY CLOSE TO WIDE FRACTURE SPACING (RUN 2) TWO SOLID CORE PIECES (RUN 3) TWO SOLID CORE PIECES (RUN 4) TWO SOLID CORE PIECES	
			5.0		(4.9) 98%	(4.7) 94%						
445	445.2	26.1										
			5.0		(4.9) 98%	(4.6) 92%	RS-5					
440	440.2	31.1									440.2	31.1
											Boring Terminated at Elevation 440.2 ft in meta-argillite	
435												
430												
425												
420												
415												
410												
405												
400												
395												
390												
385												
380												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 24+60	**OFFSET** 25 ft LT	**ALIGNMENT** -L- / **0 HR.** NM
COLLAR ELEV. 458.6 ft	**TOTAL DEPTH** 36.1 ft	**NORTHING** 411,575	**EASTING** 1,579,062 / **24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/15/10	**COMP. DATE** 01/15/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
460										458.6 GROUND SURFACE	0.0
455										**ALLUVIAL** VERY LOOSE TO LOOSE SAND & GRAVEL (A-1-b) 455.1	3.5
	454.1	4.5	9	55	60/.1	60/.1				**RESIDUAL** RED-TAN HARD MOIST CLAYEY SANDY SILT (A-4) 453.6	5.0
450										**WEATHERED ROCK** SEVERELY WEATHRED CRYSTALLINE ROCK 450.4	8.2
										450.0	8.6
445										**CRYSTALLINE ROCK** GRAY-BROWN MODERATELY TO VERY SLIGHTLY WEATHERD, MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	
440										**CRYSTALLINE ROCK** GRAY-BROWN MODERATELY TO VERY SLIGHTLY WEATHERD, MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	
435										434.1	24.5
430							RS-9			**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING	
425										422.5	36.1
420										Boring Terminated at Elevation 422.5 ft in meta-argillite	
415											
410											
405											
400											
395											
390											
385											
380											

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 13

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 24+60	**OFFSET** 25 ft LT	**ALIGNMENT** -L- / **0 HR.** NM
COLLAR ELEV. 458.6 ft	**TOTAL DEPTH** 36.1 ft	**NORTHING** 411,575	**EASTING** 1,579,062 / **24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/15/10	**COMP. DATE** 01/15/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NO/NQ	**TOTAL RUN** 27.5 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
450											Begin Coring @ 8.6 ft	
	450.0	8.6	2.5		(2.2) 88%	(0.6) 24%		(15.6) 98%	(3.0) 19%		450.0 **CRYSTALLINE ROCK** GRAY-BROWN MODERATELY TO VERY SLIGHTLY WEATHERD, MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING (RUN 1) AVERAGE FRACTURE SPACING = 0.2' (RUN 2) AVERAGE FRACTURE SPACING = 0.25' (RUN 3) AVERAGE FRACTURE SPACING = 0.3' (RUN 4) AVERAGE FRACTURE SPACING = 0.3'	8.6
	447.5	11.1										
445			5.0		(5.0) 100%	(0.4) 8%						
	442.5	16.1										
440			4.8		(4.8) 100%	(1.1) 23%						
	437.7	20.9										
435			5.2		(5.2) 100%	(0.9) 17%					434.1	24.5
	432.5	26.1						(11.6) 100%	(7.3) 63%		**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING (RUN 5) AVERAGE FRACTURE SPACING = 1.0' (RUN 6) AVERAGE FRACTURE SPACING = 0.7'	
430			5.0		(5.0) 100%	(3.4) 68%	RS-9					
	427.5	31.1										
425			5.0		(5.0) 100%	(3.9) 78%						
	422.5	36.1									422.5	36.1
420											Boring Terminated at Elevation 422.5 ft in meta-argillite	
415												
410												
405												
400												
395												
390												
385												
380												
375												
370												

NCDOT CORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 24+49	**OFFSET** 20 ft RT	**ALIGNMENT** -L- — **0 HR.** 1.0
COLLAR ELEV. 453.3 ft	**TOTAL DEPTH** 31.1 ft	**NORTHING** 411,560	**EASTING** 1,579,106 — **24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/20/10	**COMP. DATE** 01/20/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
455										453.3 GROUND SURFACE	0.0
450										**ALLUVIAL** BROWN VERY LOOSE TO LOOSE SAND & GRAVEL (A-1-b) — 449.3	4.0
										449.1 **RESIDUAL** RED-TAN HARD MOIST CLAYEY SANDY SILT WITH ROCK FRAGMENTS (A-4)	4.2
445										**CRYSTALLINE ROCK** BROWN & GRAY MODERATELY SEVERELY TO MODERATELY WEATHERED MODERATELY HARD TO HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	
440											
435											
430											
425										427.6 **CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	25.7
420										422.2 Boring Terminated at Elevation 422.2 ft in meta-argillite	31.1
415											
410											
405											
400											
395											
390											
385											
380											
375											

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 14

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 24+49	**OFFSET** 20 ft RT	**ALIGNMENT** -L- — **0 HR.** 1.0
COLLAR ELEV. 453.3 ft	**TOTAL DEPTH** 31.1 ft	**NORTHING** 411,560	**EASTING** 1,579,106 — **24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/20/10	**COMP. DATE** 01/20/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NO/NQ	**TOTAL RUN** 26.9 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
449.1											Begin Coring @ 4.2 ft	
	449.1	4.2	2.5		(2.5) 100%	(0.0) 0%		(21.5) 100%	(1.1) 5%		449.1 **CRYSTALLINE ROCK** BROWN & GRAY MODERATELY SEVERELY TO MODERATELY WEATHERED MODERATELY HARD TO HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	4.2
	446.6	6.7										
445			5.0		(5.0) 100%	(0.0) 0%						
	441.6	11.7										
440			5.0		(5.0) 100%	(1.1) 22%						
	436.6	16.7										
435			5.0		(5.0) 100%	(0.0) 0%						
	431.6	21.7										
430			5.0		(5.0) 100%	(0.0) 0%						
	426.6	26.7						(5.4) 100%	(0.8) 15%		427.6 **CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	25.7
425			4.4		(4.4) 100%	(0.8) 18%						
	422.2	31.1									422.2 Boring Terminated at Elevation 422.2 ft in meta-argillite	31.1
420												
415												
410												
405												
400												
395												
390												
385												
380												
375												
370												

NCDOT CORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 24+95	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 459.6 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 411,610	**EASTING** 1,579,070	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/19/10	**COMP. DATE** 01/19/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										459.6 GROUND SURFACE	0.0
										ALLUVIAL BROWN STIFF MOIST CLAYEY SANDY SILT (A-4)	
										452.2	7.4
										452.1 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	7.5
										447.0 **CRYSTALLINE ROCK** GRAY MODERATELY TO SLIGHTLY WEATHERED MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	12.6
							RS-6			**CRYSTALLINE ROCK** GRAY VERY SLIGHTLY WEATHERED TO FRESH HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	
							RS-7			424.3	35.3
										Boring Terminated at Elevation 424.3 ft in meta-argillite	

460 455 450 445 440 435 430 425 420 415 410 405 400 395 390 385 380

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 05/20/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 15

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 24+95	**OFFSET** 20 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 459.6 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 411,610	**EASTING** 1,579,070	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/19/10	**COMP. DATE** 01/19/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NO/NQ	**TOTAL RUN** 27.8 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
452.1											Begin Coring @ 7.5 ft	
	452.1	7.5	3.4		(3.2) 94%	(0.0) 0%		(4.9) 96%	(0.0) 0%		452.1 **CRYSTALLINE ROCK** GRAY MODERATELY TO SLIGHTLY WEATHERED MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING (RUN 1) AVERAGE FRACTURE SPACING = 0.35'	7.5
	448.7	10.9	5.0		(5.0) 100%	(3.3) 66%					447.0	12.6
	443.7	15.9	5.0		(5.0) 100%	(2.3) 46%	RS-6	(22.3) 98%	(10.3) 45%		**CRYSTALLINE ROCK** GRAY VERY SLIGHTLY WEATHERED FRESH HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING (RUN 2) SOLID PIECE OF CORE FROM 12.8-15.9' (RUN 3) AVERAGE FRACTURE SPACING = 0.25' (RUN 4) AVERAGE FRACTURE SPACING = 0.25' (RUN 5) AVERAGE FRACTURE SPACING = 0.5' (RUN 6) AVERAGE FRACTURE SPACING = 0.18'	
	438.7	20.9	5.0		(5.0) 100%	(0.5) 10%						
	433.7	25.9	5.0		(4.8) 96%	(3.6) 72%	RS-7					
	428.7	30.9	4.4		(4.4) 100%	(0.6) 14%						
	424.3	35.3									424.3	35.3
											Boring Terminated at Elevation 424.3 ft in meta-argillite	

452.1 450 445 440 435 430 425 420 415 410 405 400 395 390 385 380 375

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 24+95	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 458.4 ft	**TOTAL DEPTH** 30.6 ft	**NORTHING** 411,607	**EASTING** 1,579,105	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 01/20/10	**COMP. DATE** 01/20/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
460											
										458.4 GROUND SURFACE	0.0
455										**ALLUVIAL** BROWN STIFF MOIST CLAYEY SANDY SILT (A-4)	3.7
										454.5 **RESIDUAL** GRAY-TAN HARD MOIST CLAYEY SANDY SILT WITH ROCK FRAGMENTS (A-4)	3.9 / 6.1
450										452.3 **WEATHERED ROCK** SEVERELY WEATHRED CRYSTALLINE ROCK	
445										**CRYSTALLINE ROCK** BROWN & GRAY MODERATELY SEVERELY WEATHERD TO MODERATELY WEATHERED MEDIUM HARD TO MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	
440											
435										435.8 **CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING	22.6
430							RS-8				
										427.8 Boring Terminated at Elevation 427.8 ft in meta-argillite	30.6
425											
420											
415											
410											
405											
400											
395											
390											
385											
380											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

SHEET 16

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 24+95	**OFFSET** 15 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 458.4 ft	**TOTAL DEPTH** 30.6 ft	**NORTHING** 411,607	**EASTING** 1,579,105	**24 HR.** NM
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Core		**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 01/20/10	**COMP. DATE** 01/20/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NO/NQ	**TOTAL RUN** 24.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
452.3											Begin Coring @ 6.1 ft	
450	452.3	6.1	4.5		(4.5) 100%	(0.0) 0%		(16.5) 100%	(0.0) 0%		452.3 **CRYSTALLINE ROCK** BROWN & GRAY MODERATELY SEVERELY WEATHERD TO MODERATELY WEATHERED MEDIUM HARD TO MODERATELY HARD META-ARGILLITE WITH VERY CLOSE TO CLOSE FRACTURE SPACING	6.1
	447.8	10.6										
445			5.0		(4.8) 96%	(0.0) 0%						
	442.8	15.6										
440			5.0		(5.0) 100%	(0.0) 0%						
	437.8	20.6										
435			5.0		(5.0) 100%	(0.0) 0%					435.8	22.6
	432.8	25.6						(8.0) 100%	(3.3) 41%		**CRYSTALLINE ROCK** GRAY FRESH HARD META-ARGILLITE WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING	
430			5.0		(5.0) 100%	(3.3) 66%	RS-8					
	427.8	30.6									427.8	30.6
425											Boring Terminated at Elevation 427.8 ft in meta-argillite	
420												
415												
410												
405												
400												
395												
390												
385												
380												
375												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 25+35	**OFFSET** 7 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 471.0 ft	**TOTAL DEPTH** 17.8 ft	**NORTHING** 411,648	**EASTING** 1,579,087
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer / Tri-Cone Roller Bit		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/25/10	**COMP. DATE** 01/25/10	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	NM
24 HR.	NM

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
470										471.0 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT RED-TAN MOIST MED. STIFF SANDY CLAYEY SILT (A-4)	
465	463.7	7.3	2	1	2	3		M			
460	458.7	12.3	2	1	2	3	SS-12	W		461.0	10.0
										ALLUVIAL TAN SOFT MOIST TO SATURATED SANDY CLAYEY SILT (A-4)	
455	453.7	17.3	60/.1			60/.1				455.0 / 454.0	16.0 / 17.0
										RESIDUAL GRAY-TAN HARD MOIST CLAYEY SANDY SILT WITH ROCK FRAGMENTS (A-4)	
450										453.7 / 453.2	17.3 / 17.8
										WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	
										CRYSTALLINE ROCK META-ARGILLITE	
445										Boring Terminated by Tri-Cone Roller Bit Refusal at Elevation 453.2 ft in meta-argillite	
440											
435											
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33818.1.1	**ID.** B-4652	**COUNTY** UNION	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 25+35	**OFFSET** 8 ft RT	**ALIGNMENT** -L-
COLLAR ELEV. 471.4 ft	**TOTAL DEPTH** 17.8 ft	**NORTHING** 411,647	**EASTING** 1,579,102
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer / Tri-Cone Roller Bit		**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 01/25/10	**COMP. DATE** 01/25/10	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	NM
24 HR.	NM

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
475											
470	470.4	1.0								471.4 GROUND SURFACE	0.0
			3	2	3	5	SS-13			**ROADWAY EMBANKMENT** TAN-BROWN MOIST MED. STIFF SANDY CLAYEY SILT (A-4)	
465											
460	459.1	12.3	2	2	3	5		W		461.4	10.0
										ALLUVIAL TAN SOFT MOIST TO SATURATED SANDY CLAYEY SILT (A-4)	
455	454.1	17.3	60/.1			60/.1				455.4 / 454.1	16.0 / 17.3
										RESIDUAL GRAY-TAN HARD MOIST CLAYEY SANDY SILT WITH ROCK FRAGMENTS (A-4)	
450										453.6	17.8
										CRYSTALLINE ROCK META-ARGILLITE	
445										Boring Terminated at Elevation 453.6 ft in meta-argillite	
440											
435											
430											
425											
420											
415											
410											
405											
400											
395											

NCDOT BORE SINGLE B4652_GEO_BH_BRDG118_UNION.GPJ NC_DOT.GDT 03/31/10

TEST RESULTS

PROJECT: 33818.1.1 (B-4652)
COUNTY: UNION
SITE DESCRIPTION: BRIDGE NO. 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941

SOIL SAMPLE RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	N	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING SIEVES 10	40	200	% MOISTURE	% ORGANIC	UNIT WT. (d)	VOID RATIO
		EB1-B																
SS-10	11 RT	23+60	2.50-4.00	A-7-6(13)	7	43	14	2.2	14.4	42.9	40.5	90	89	81				
SS-11	11 RT	23+60	7.00-9.00	A-4(3)	21	32	5	10.3	24.7	38.7	26.3	97	92	69				
		B1-A																
SS-15	16 LT	24+05	7.50-9.00	A-4(2)	10	33	10	31.6	8.9	29.1	30.4	80	59	49				
		B1-B																
SS-14	11 RT	24+05	7.50-9.00	A-4(1)	40	32	7	27.9	16.2	27.5	28.3	74	59	44				
		EB2-A																
SS-12	7 LT	25+35	12.30-13.80	A-4(7)	3	31	10	6.9	9.1	41.5	42.5	95	93	82				
		EB2-B																
SS-13	8 RT	25+35	1.00-2.50	A-4(3)	5	24	6	6.1	9.9	49.6	34.4	91	87	80				

ROCK SAMPLE RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	RQD	UNIT WT (lbf/ft3)	Q (ksf)	E (MPsi)
		B1-A					
RS-1	16 LT	24+05 -L-	18.80-19.50	80%	169.6	3916.8	10.15
RS-2	16 LT	24+05 -L-	24.00-24.60	90%	172.3	3873.6	11.39
RS-3	16 LT	24+05 -L-	33.00-33.70	67%	171	3988.8	12.78
		B1-B					
RS-4	11 RT	24+05 -L-	17.20-17.90	95%	172.1	3499.2	9.59
RS-5	11 RT	24+05 -L-	26.90-27.40	92%	177.1	3585.6	10.35
		B2-A					
RS-9	25 LT	24+60 -L-	28.2-29.0	68%	171.1	3312	11.89
		B3-A					
RS-6	20 LT	24+95 -L-	15.1-15.8	66%	171	3528	9.4
RS-7	20 LT	24+95 -L-	28.0-28.5	72%	170.3	2504.2	9.3
		B3-B					
RS-8	15 RT	24+95 -L-	27.1-27.6	66%	169.4	1429.9	5.27

NOTE: SAMPLES SS-1 THROUGH SS-9
NOT SUBMITTED FOR TESTING.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

PROJECT: B-4652 ID: 33818.1.1 COUNTY: UNION

DESCRIPTION(1): Bridge No. 118 OVER LANES CREEK ON SR 1937

EXISTING BRIDGE

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

Bridge No.: 118 Length: 121.1' Total Bents: 5 Bents in Channel: 2 Bents in Floodplain: 3
Foundation Type: ____

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: MINOR SCOUR AT EXISTING ABUTMENT ONE, SAND FILLED

Interior Bents: MINOR SCOUR AT EXISTING BENT ONE, SAND FILLED

Channel Bed: MINOR SCOUR OCCURING IN CHANNEL BETWEEN END BENT ONE AND BENT ONE

Channel Bank: STABLE

EXISTING SCOUR PROTECTION

Type(3): VERTICAL CONCRETE ABUTMENT W/STACKED ROCK EXTENSIONS

Extent(4): WING WALLS ABOUT 10-12'

Effectiveness(5): GOOD

Obstructions(6): NONE AT 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, 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 geotechnically adjusted scour elevation (GASE) 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 theoritical scour and the GASE. If the GASE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The GASE 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 & GRAVEL RUNNING ON ROCK

Channel Bank Material(8): ALLUVIAL TAN SANDY SILT

Channel Bank Cover(9): WOODS

Floodplain Width(10): 500' +/-

Floodplain Cover(11): WOODS

Stream is(12): Aggrading ____ Degrading ____ Static X

Channel Migration Tendency(13): SIGNIFICANT - TOWARDS EB2

Observations and Other Comments: ____

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14) Feet ____ Meters ____

BENTS

END BENT ONE	NA	NO	IMPACT								
BENT ONE	NO	SCOUR									
BENT TWO	450										
BENT THREE	452										
END BENT TWO	NA	NO	IMPACT								

Comparison of GASE to Hydraulics Unit theoretical scour:
ALL DESIGN SCOUR ELEVATIONS ARE EQUIVALENT TO THE HYDRAULICS THEORETICAL SCOUR.
ZERO SCOUR PREDICTED AT BENT ONE. NO END BENT IMPACT.

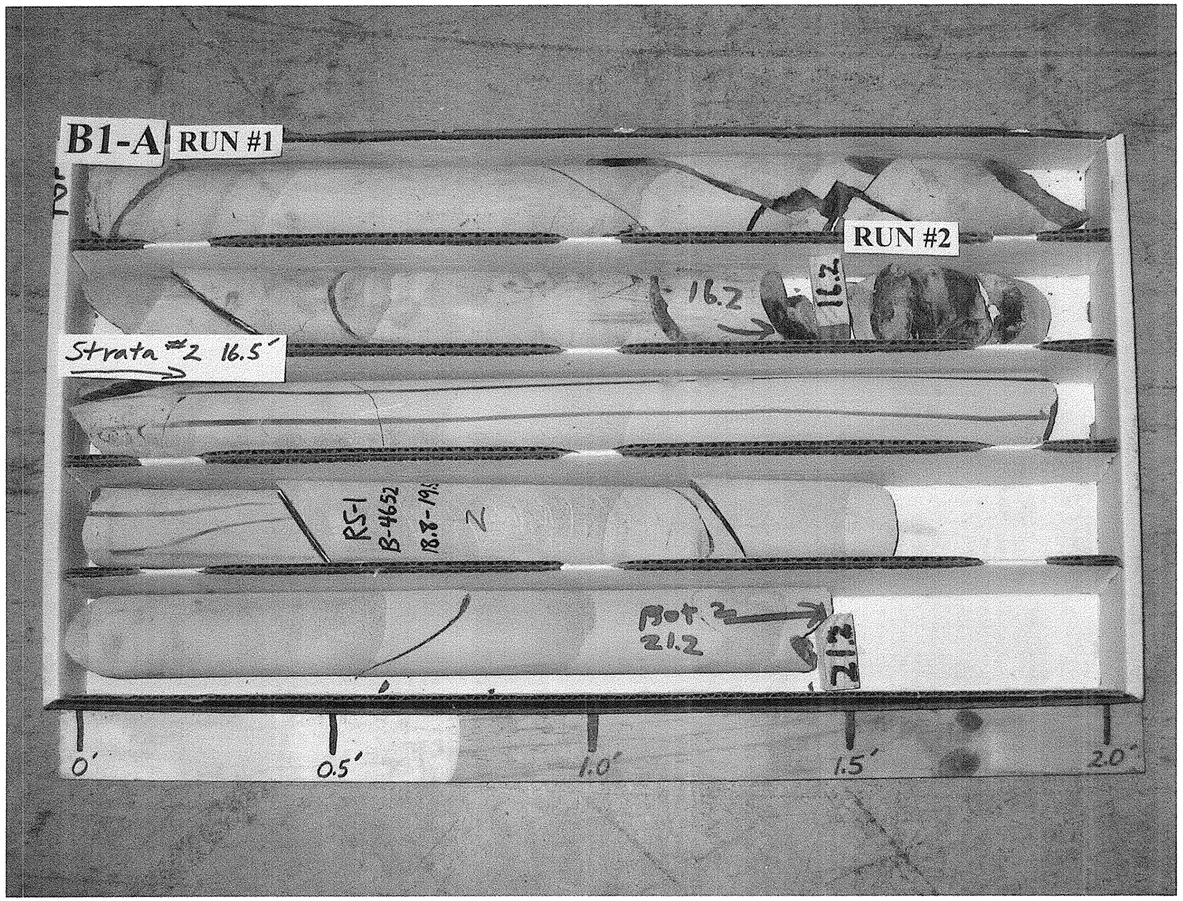
SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

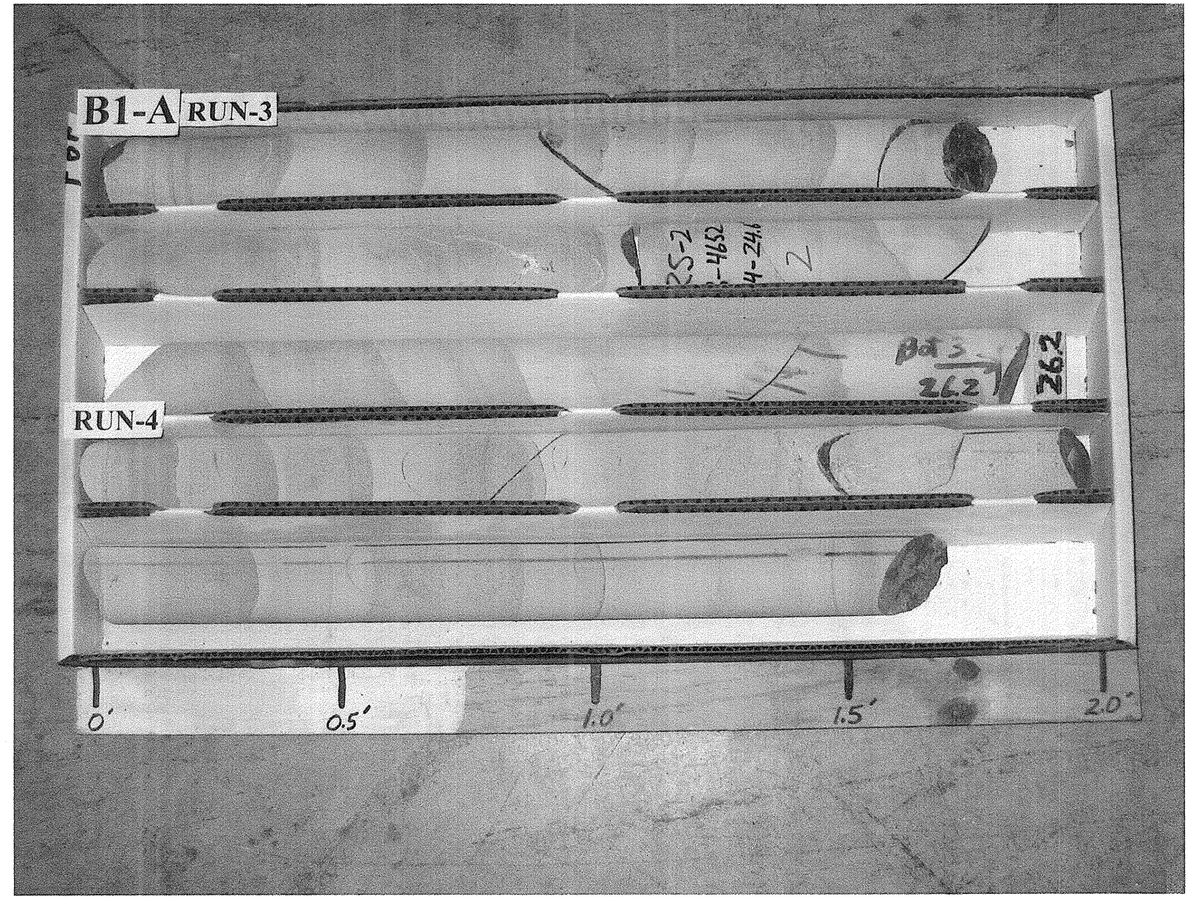
Bed or Bank	BANK						
Sample No.	SS-15						
Retained #4	2						
Passed #10	80						
Passed #40	59						
Passed #200	49						
Coarse Sand	31.6						
Fine Sand	8.9						
Silt	29.1						
Clay	30.4						
LL	33						
PI	10						
AASHTO	A-4(2)						
Station	24+39						
Offset	9LT						
Depth	7.5 - 8.90						

Reported by: Clay C. Murray, C. Little **Date:** 2/4/2010

33818.1.1 B-4652
UNION COUNTY
BRIDGE 118 OVER LANES CREEK ON SR 1937 (AUSTIN RD) BETWEEN SR 1915 AND SR 1941

B1-A





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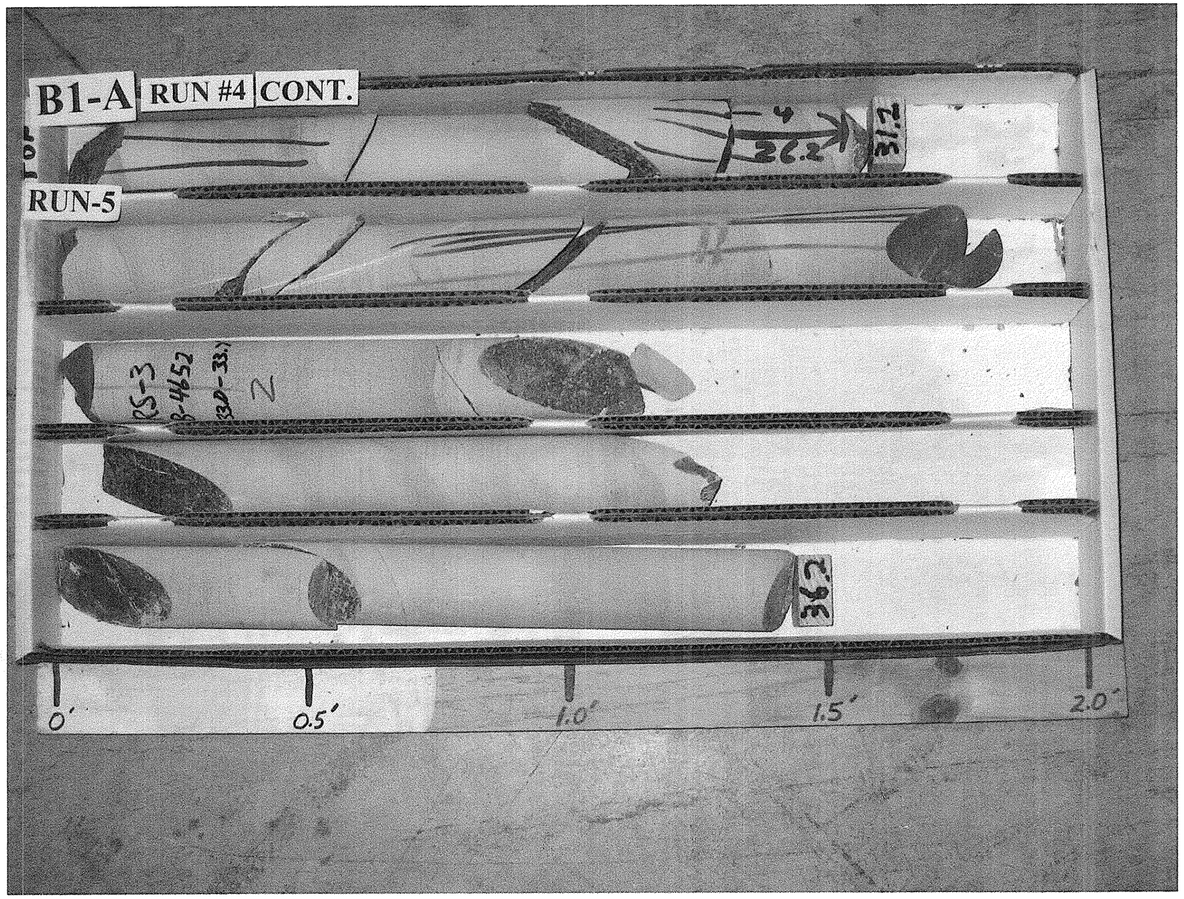
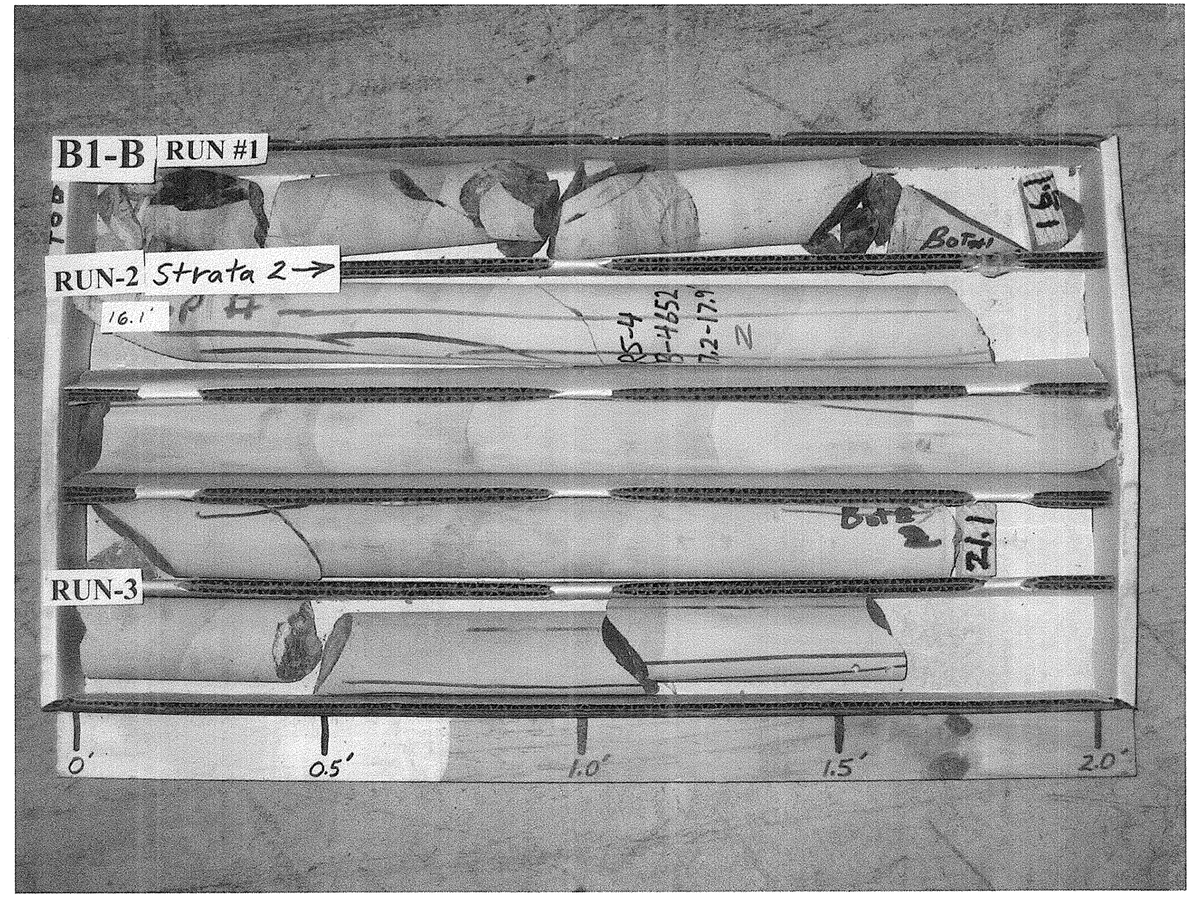
B1-A & B1-B





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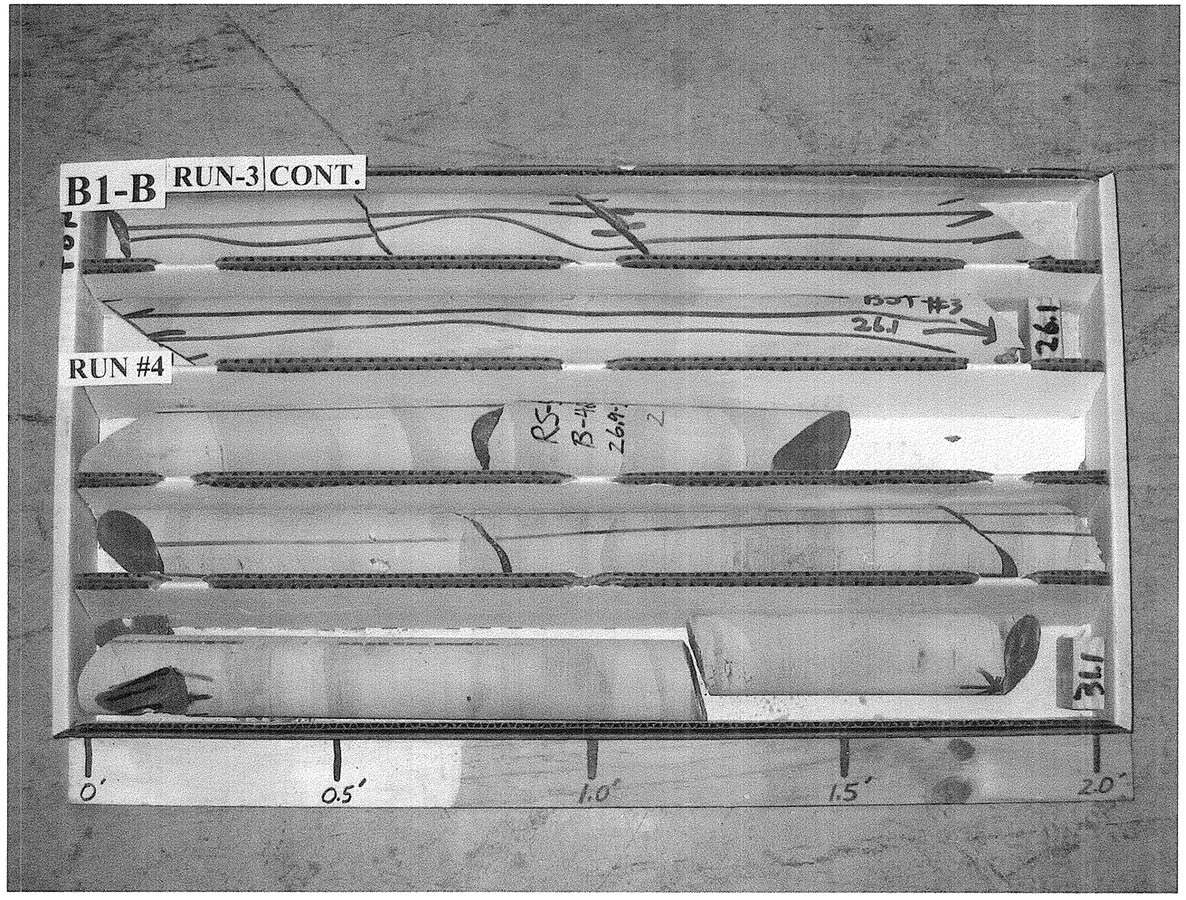
B1-B & B2-A



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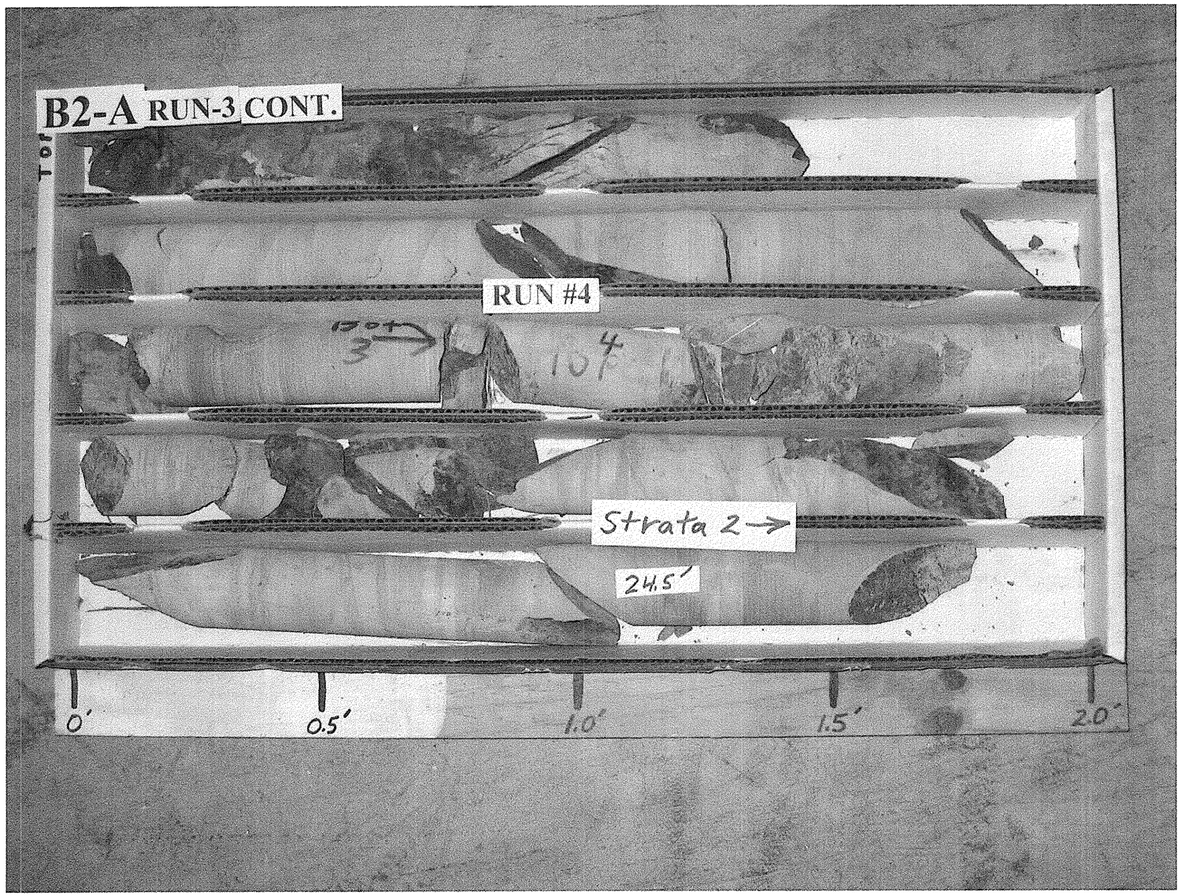
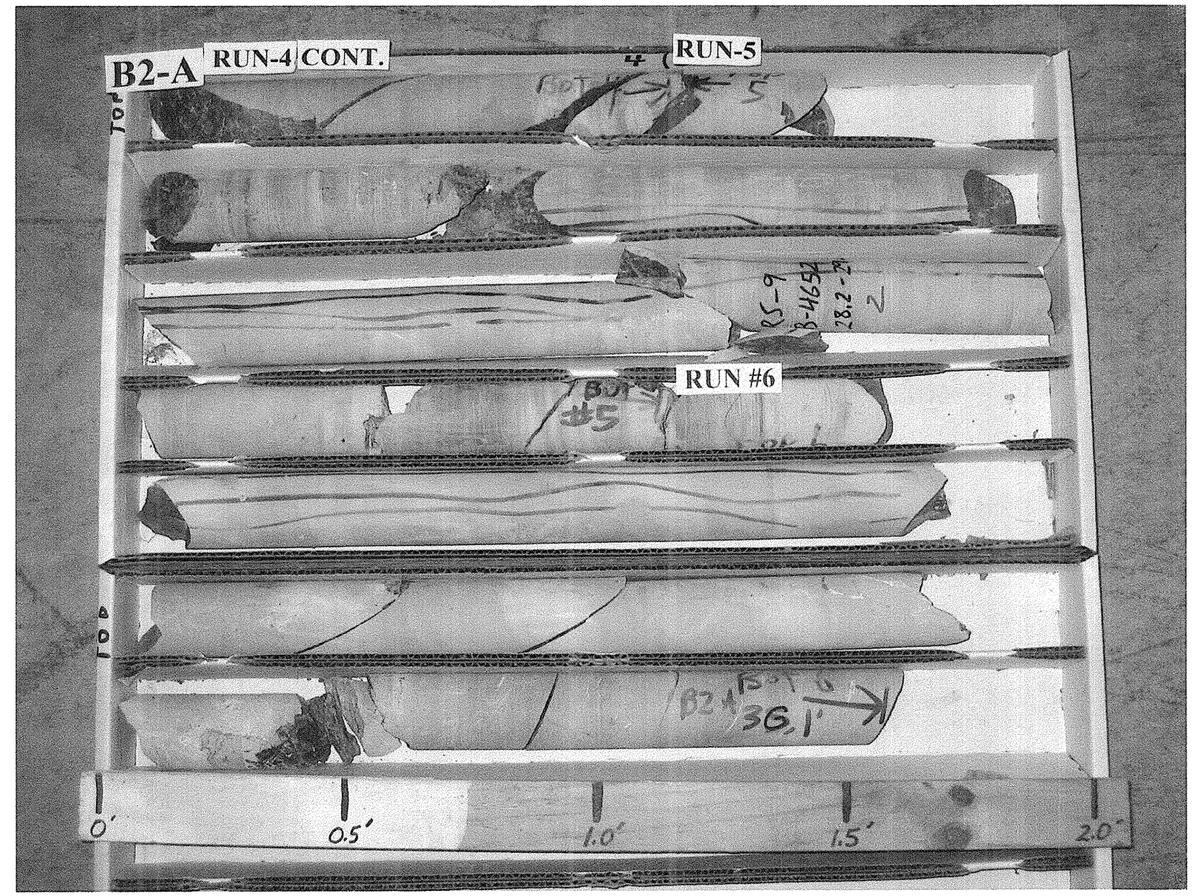
B2-A





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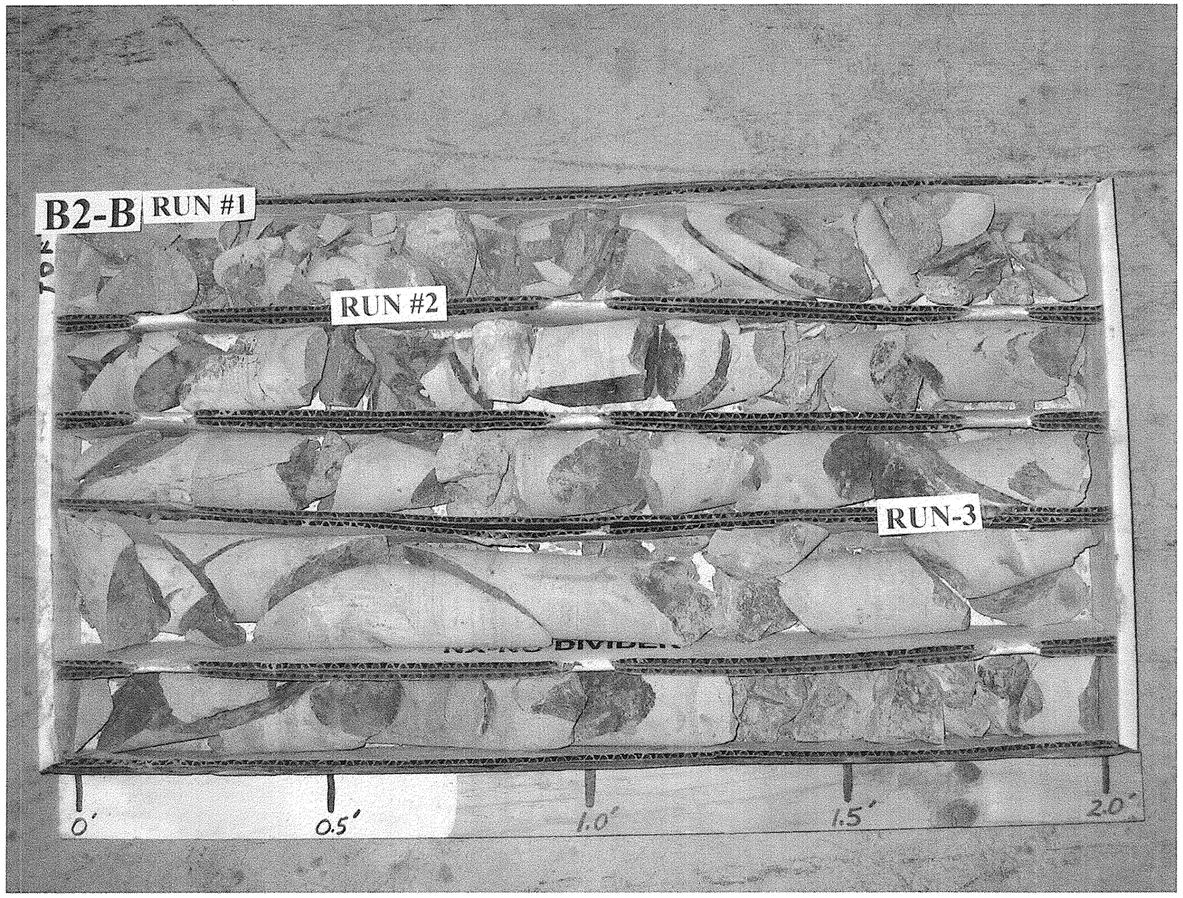
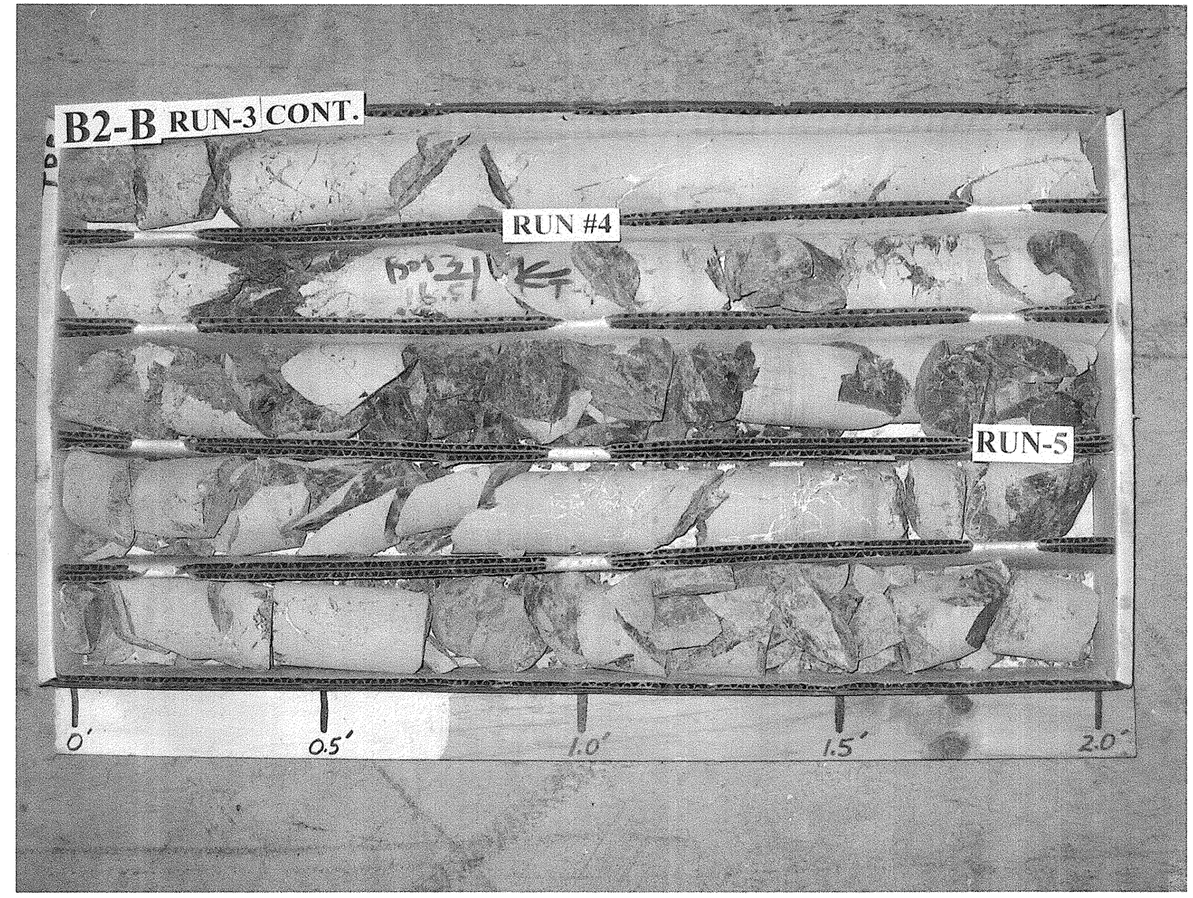
B2-B





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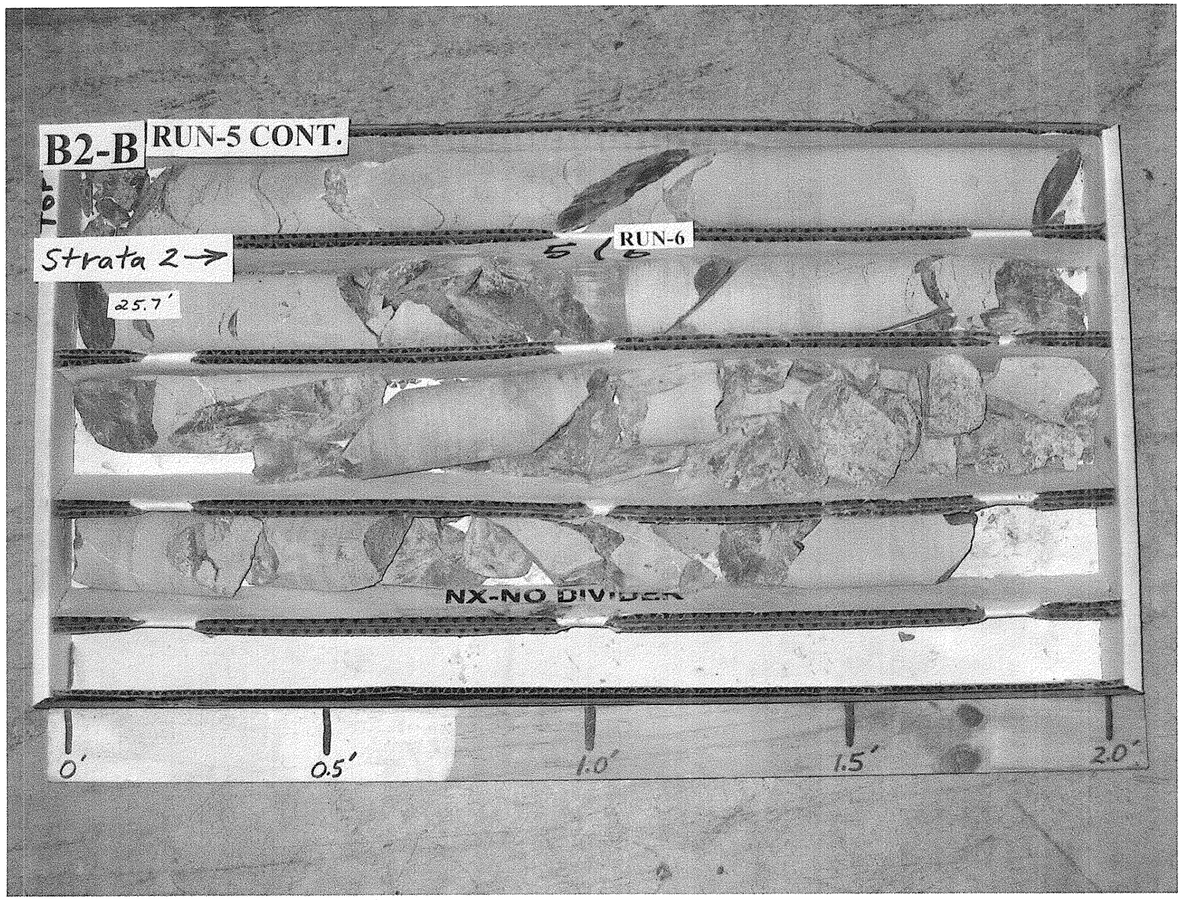
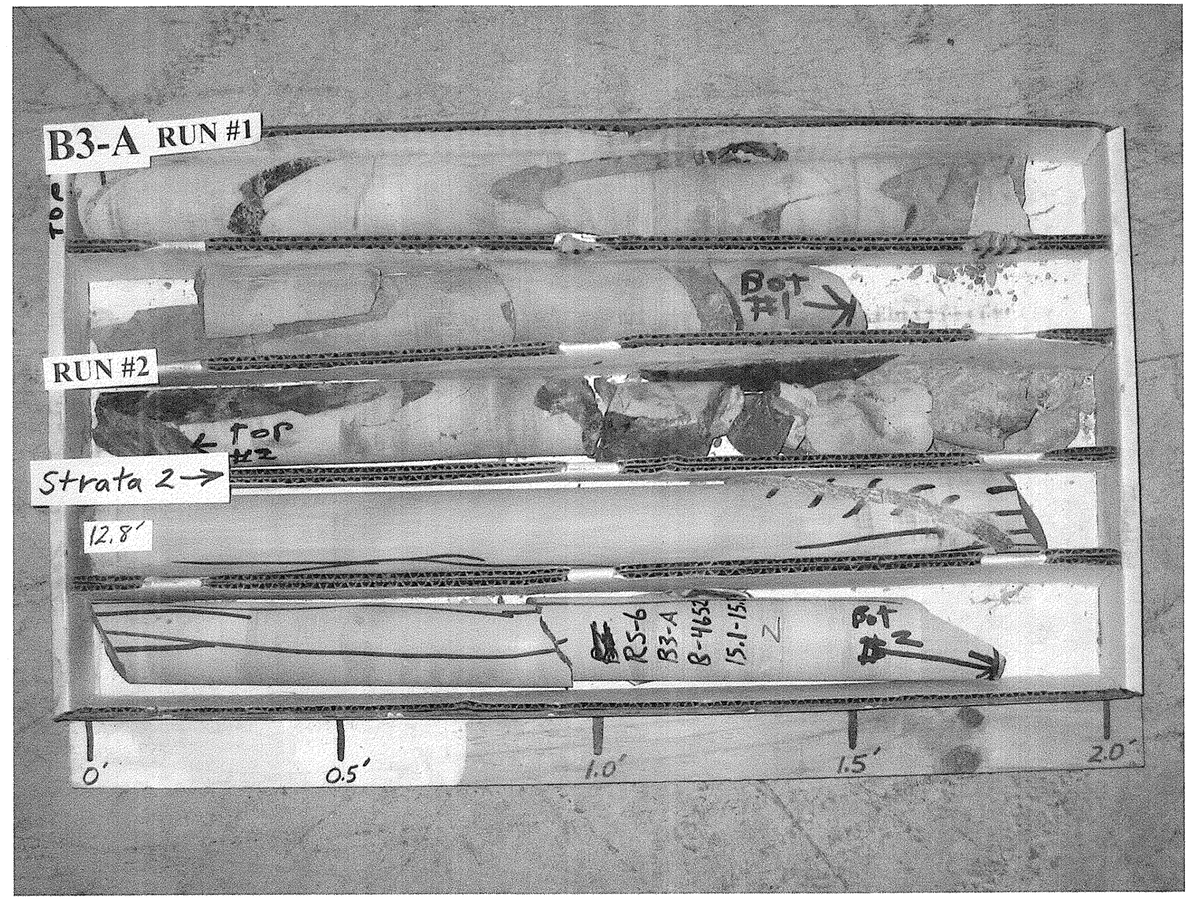
B2-B & B3-A





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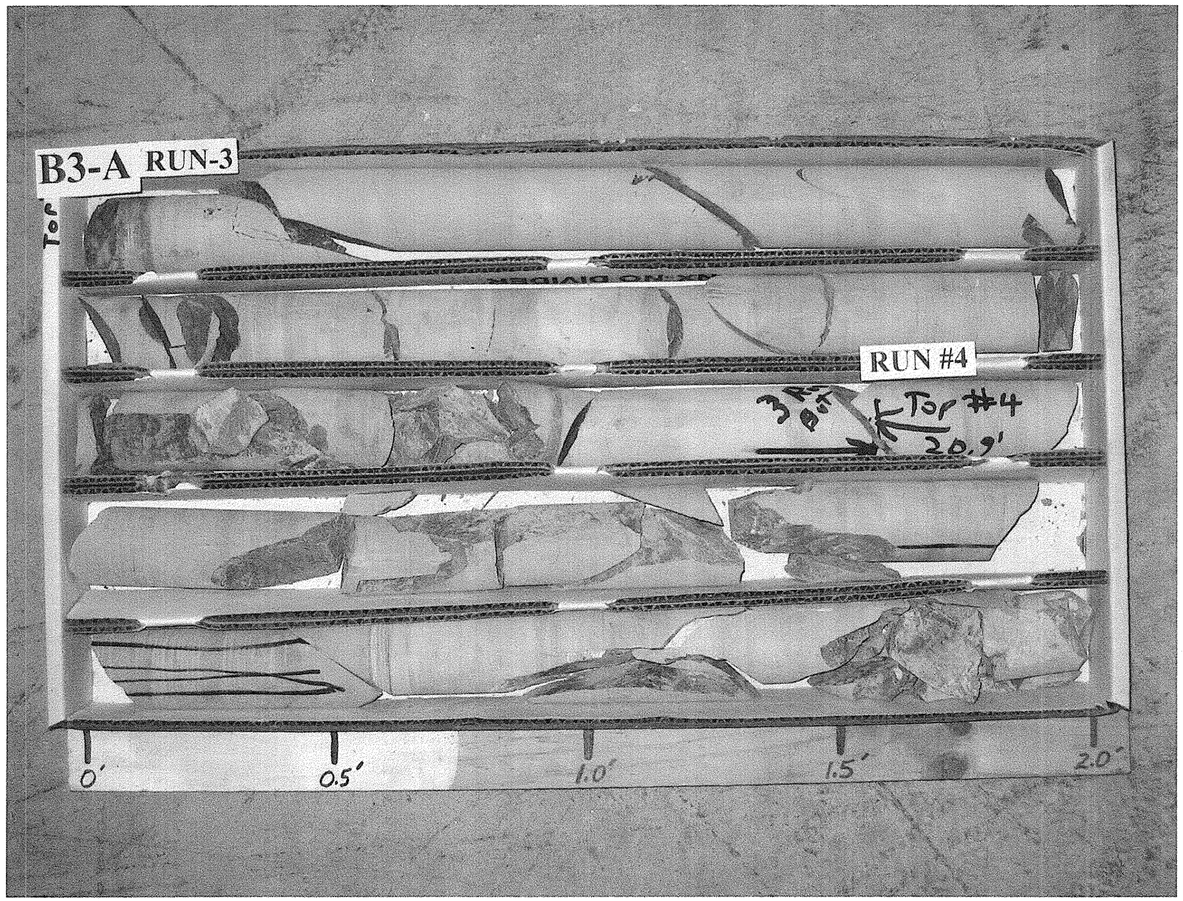
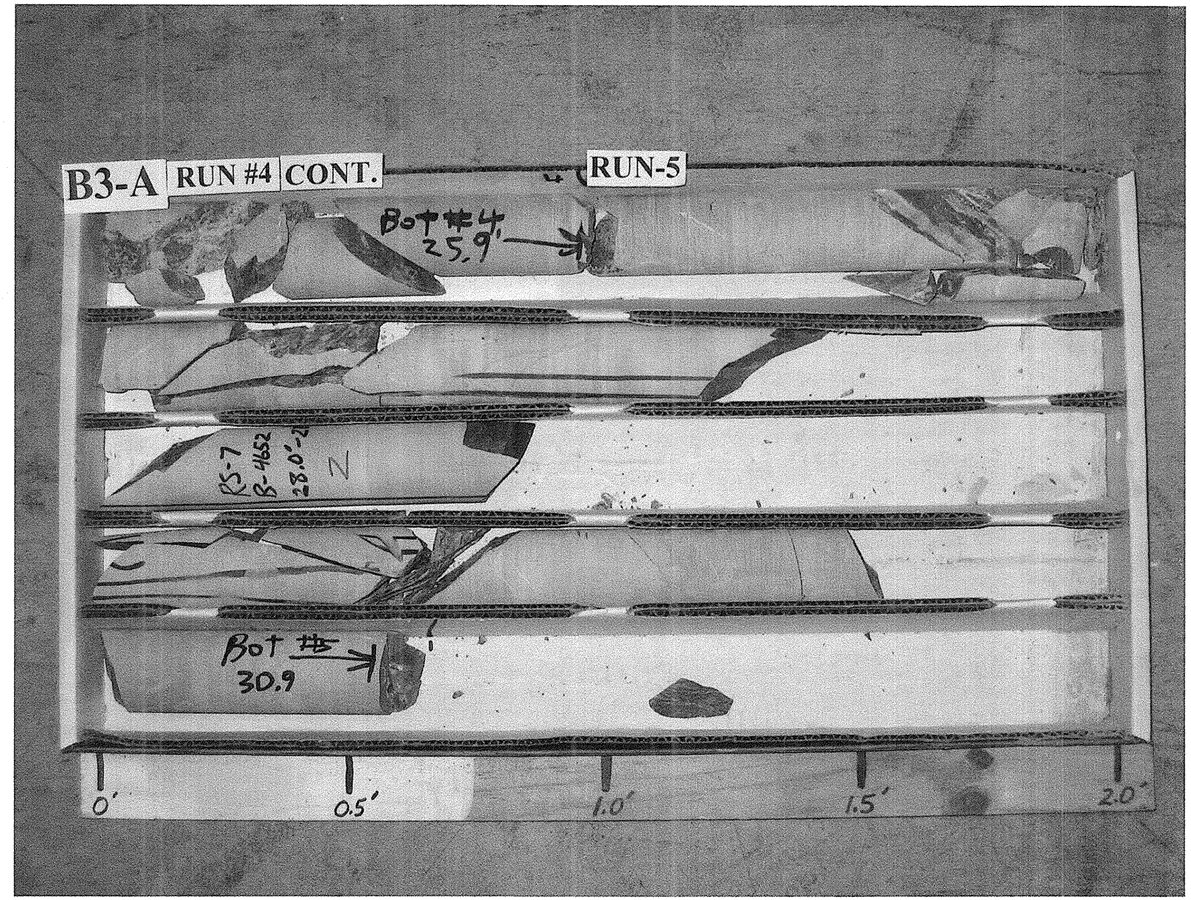
B3-A





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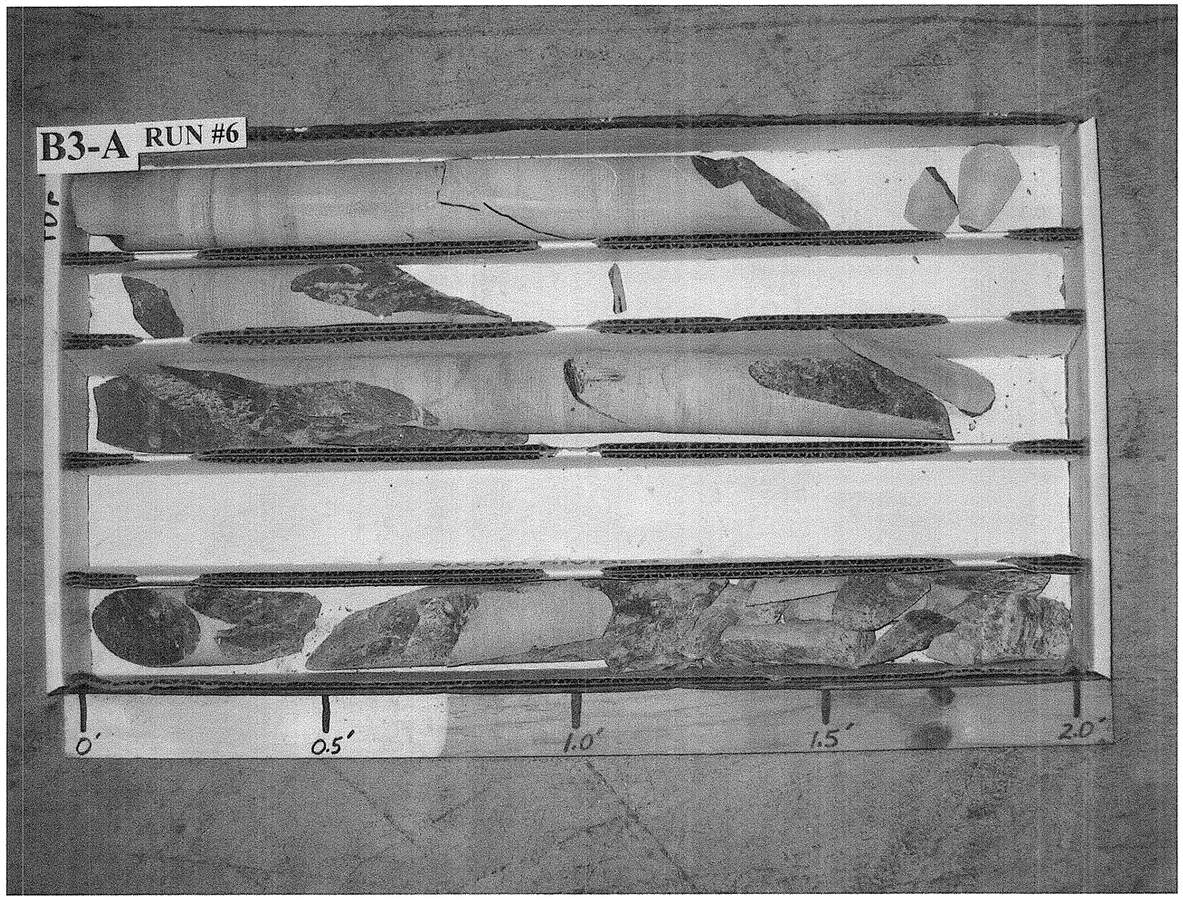
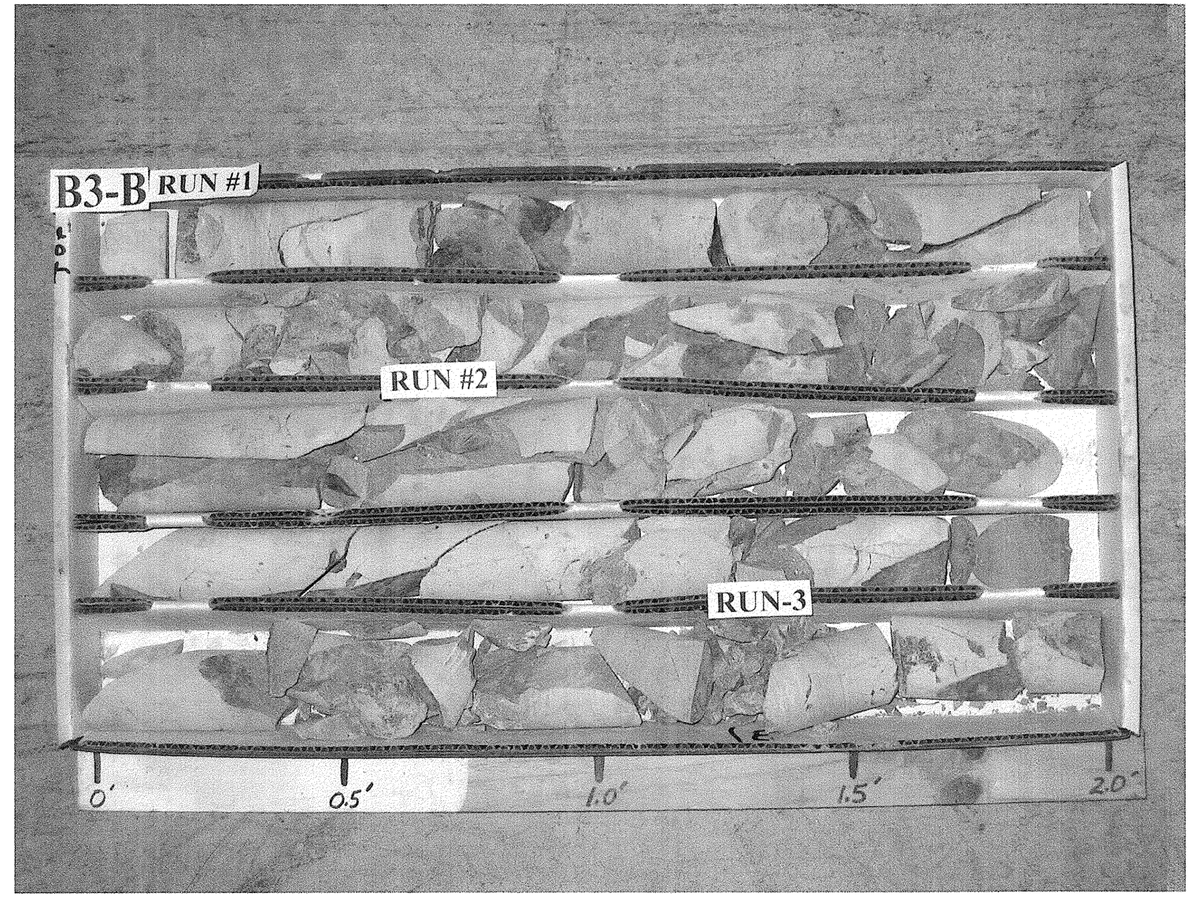
B3-A & B3-B





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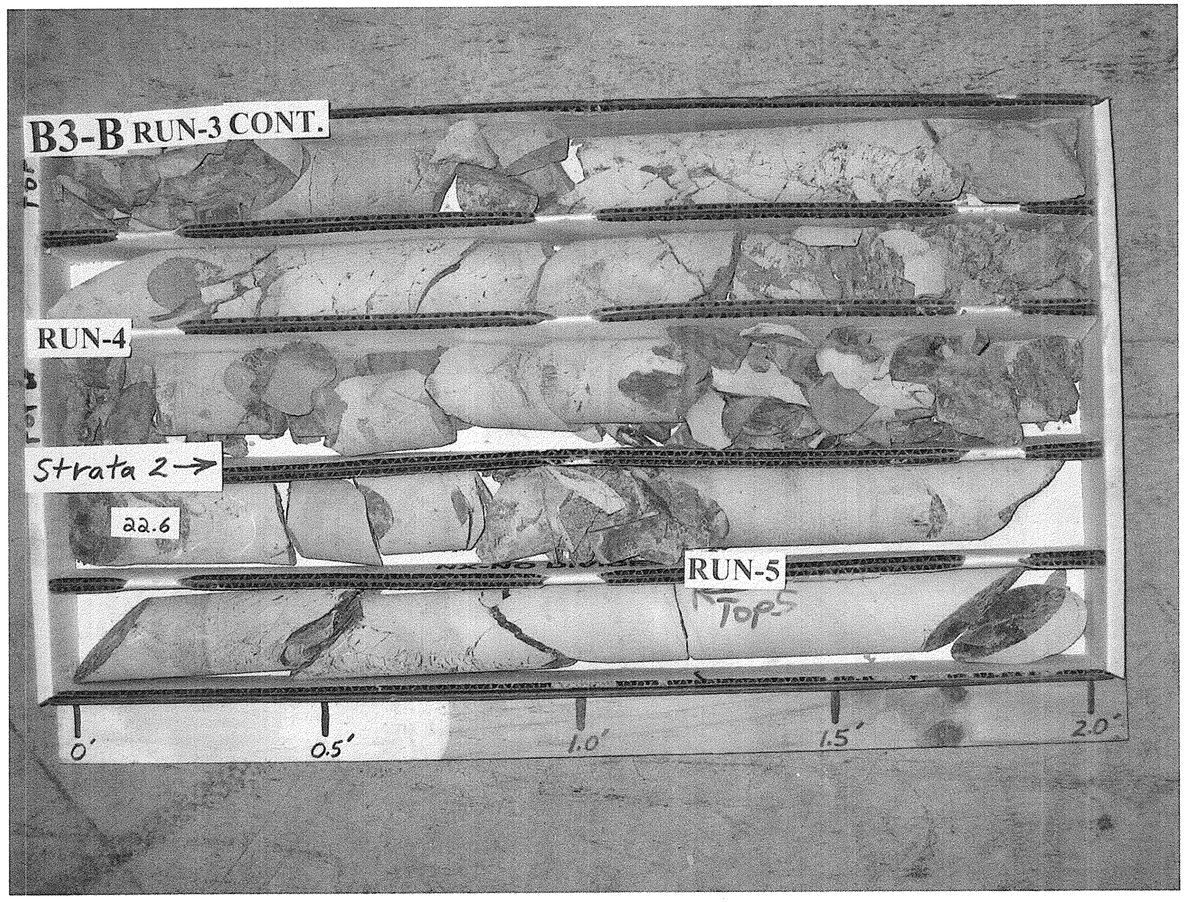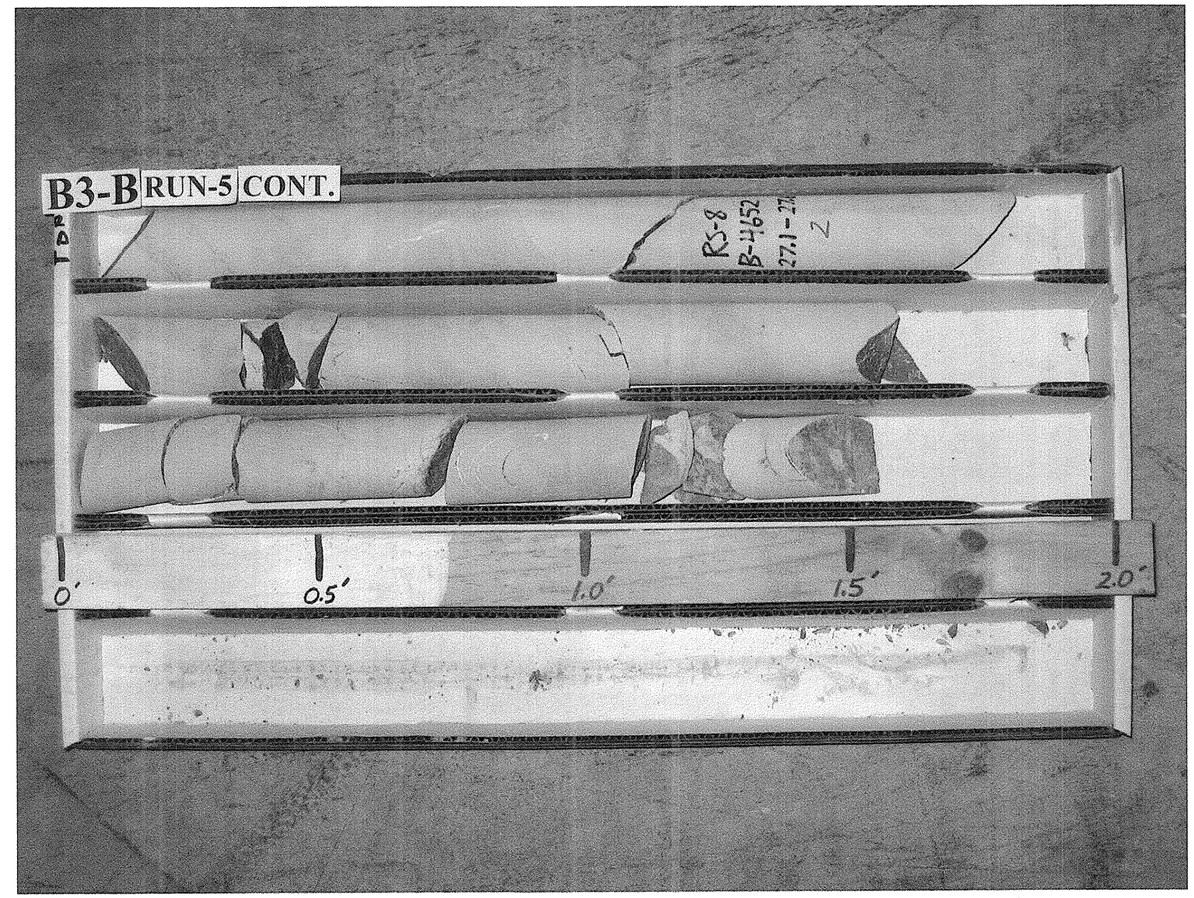
B3-B