

PROJECT: 33822.1.1 ID: B-4660

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33822.1.1 (B-4660)	1	30

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STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33822.1.1 (B-4660) F.A. PROJ. BRSTP-2000(4)
COUNTY WAKE
PROJECT DESCRIPTION BRIDGE NO. 019 OVER THE
NEUSE RIVER ON SR 2000, BETWEEN
SR 2006 AND NC 98

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.

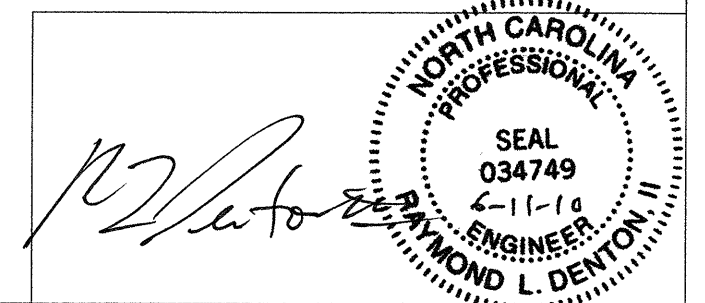
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

- R.L. DENTON
- S. HARDISON
- T. GRADWELL
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INVESTIGATED BY R.L. DENTON
CHECKED BY B.C. HALE
SUBMITTED BY R.L. DENTON
DATE 4/23/10

Structure Design



DRAWN BY: M. FAIR

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

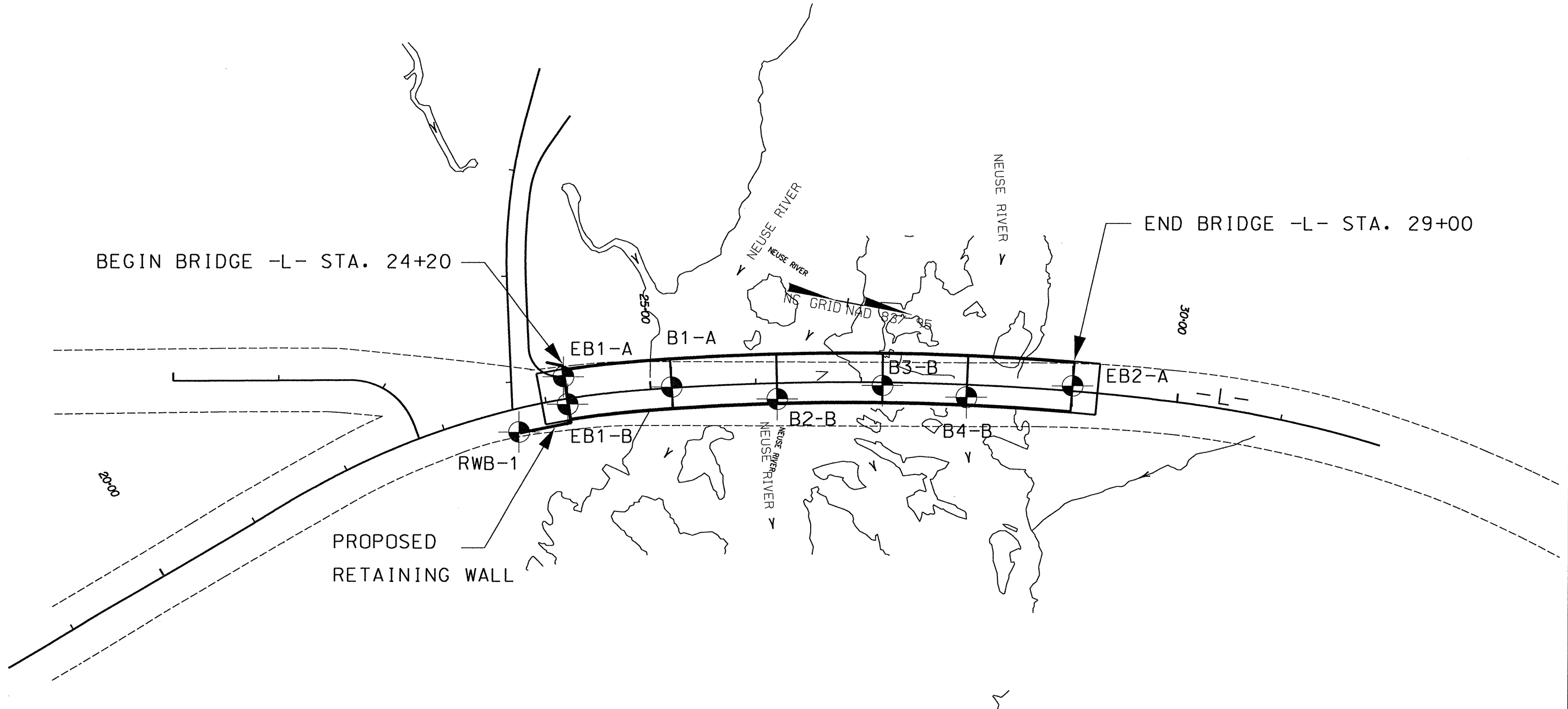
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO.
33822.1.1 (B-4660) SHEET NO.
2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

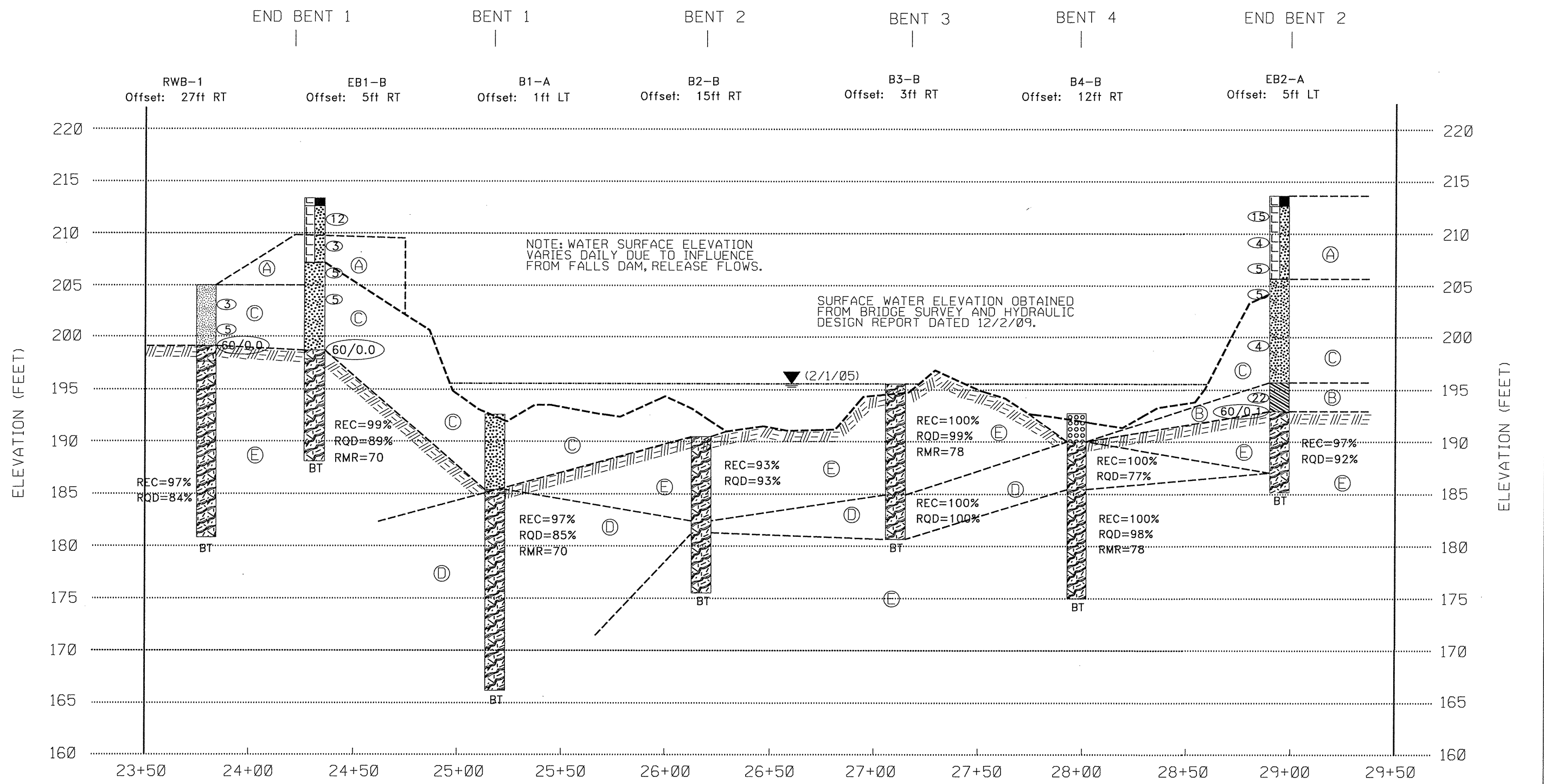
SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS			
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION 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, ANGLE, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7</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. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.				ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ADUIFIER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE 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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
SOIL LEGEND AND AASHTO CLASSIFICATION				MINERALOGICAL COMPOSITION				WEATHERING				GROUND WATER			
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.				COMPRESSION 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 SILT-CLAY 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			
CONSISTENCY OR DENSENESS				MISCELLANEOUS SYMBOLS				ROCK HARDNESS				ABBREVIATIONS			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES				TEST BORING WITH CORE TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD				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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.			
TEXTURE OR GRAIN SIZE				SOIL MOISTURE - CORRELATION OF TERMS				EQUIPMENT USED ON SUBJECT PROJECT				FRACTURE SPACING			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.75 2.00 0.42 0.25 0.075 0.053				SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:				BEDDING THICKNESS			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)				LL - LIQUID LIMIT PLASTIC RANGE (PI) PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT				MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST				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			
PLASTICITY				INDURATION				INDURATION				INDURATION			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.				FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED				RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.			
COLOR				FRACTURE SPACING				FRACTURE SPACING				FRACTURE SPACING			
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.				CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT				AUTOMATIC MANUAL -B -N -D -H POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST				BENCH MARK: MANHOLE @ BASE OF RETAINING WALL APPROXIMATE STA 23+75 160' LT. ELEVATION: 211.90 FT.			



SITE PLAN/BORING LOCATION PLAN
 BRIDGE NO. 019 OVER THE NEUSE RIVER
 ON SR 2000, BETWEEN SR 2006 AND NC 98
 NC DOT PROJECT NO. 33822.1.1
 ID: B-4660

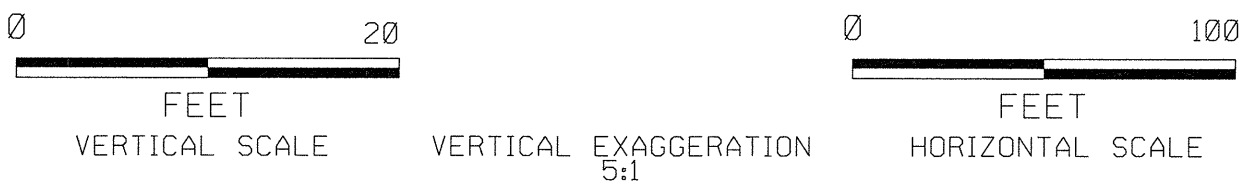


REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 3



- (A) ROADWAY EMBANKMENT FILL: VERY LOOSE TO MEDIUM DENSE, RED BROWN SILTY CLAYEY SAND WITH TRACE ASPHALT FRAGMENTS A-2-4
- (B) RESIDUAL: GRAY, VERY STIFF SANDY CLAY A-6
- (C) ALLUVIAL: LOOSE TO VERY LOOSE TAN BROWN SILTY, CLAYEY FINE SAND TO CLAYEY SILT A-1 TO A-2-4 TO A-4
- (D) CRYSTALLINE ROCK: LIGHT TO DARK GRAY, SLIGHTLY WEATHERED TO FRESH, HARD, MODERATLY CLOSE TO WIDE FRACTURE SPACING, BIOTITE GNEISS
- (E) CRYSTALLINE ROCK: WHITE, PINK, GRAY, MODERATE TO FRESH WEATHERING, HARD, MODERATELY CLOSE TO WIDE, FRACTURE SPACING, GRANITIC GNEISS

-GROUND LINE PROFILE ALONG -L- OBTAINED FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 12/2/09
 -INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE ALONG -L-.



PROFILE ALONG -L-
 BRIDGE NO. 019 OVER THE NEUSE RIVER
 ON SR 2000, BETWEEN SR 2006 AND NC 98
 NCDOT PROJECT NO. 33822.1.1
 ID NO. B-4660

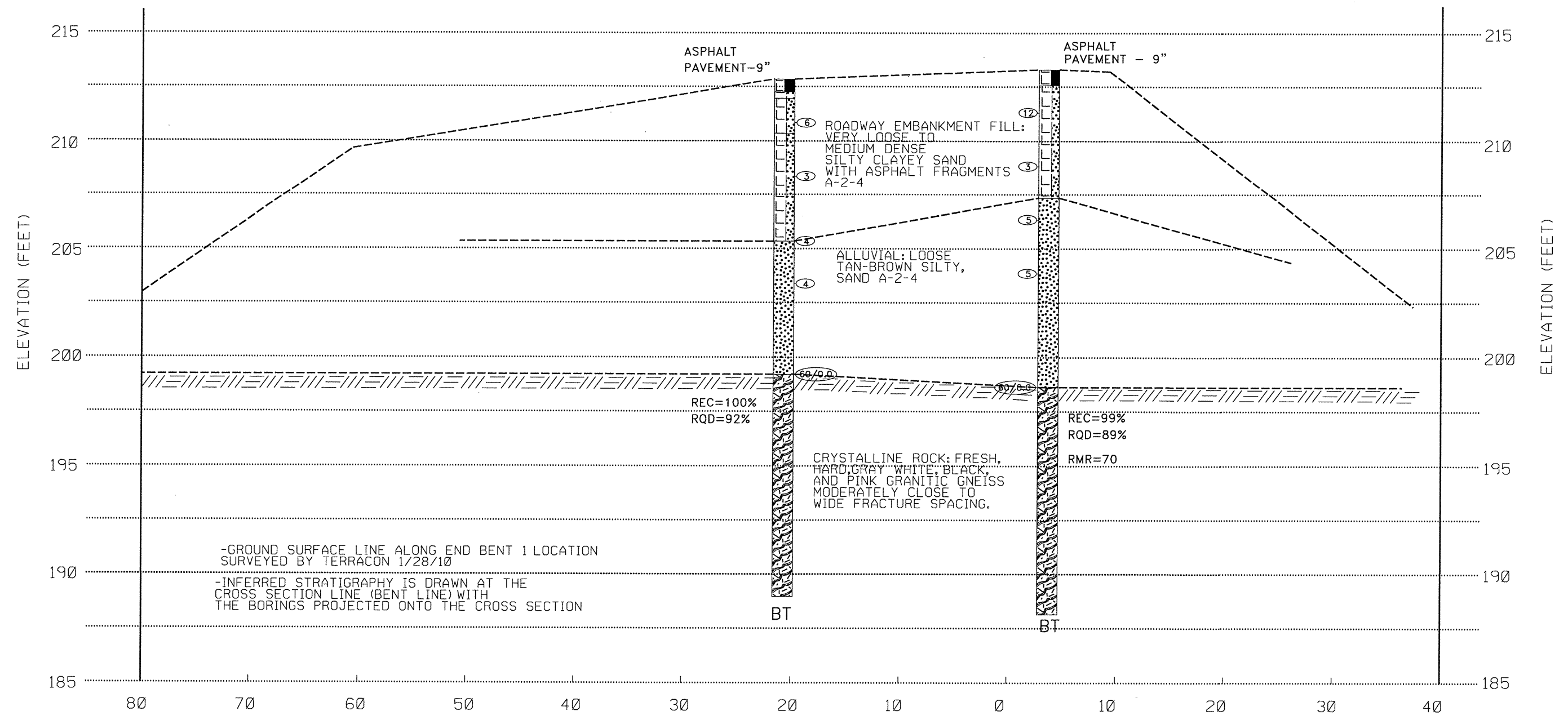


REVISIONS	DRAWN: TLY	DATE: 4/23/10
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	ENG CHECK: RLD	DWG: 4

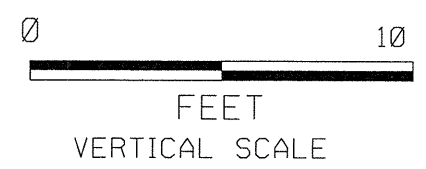
|
C OF -L-

EB1-A
STATION: 24+20

EB1-B
STATION: 24+20



-GROUND SURFACE LINE ALONG END BENT 1 LOCATION SURVEYED BY TERRACON 1/28/10
-INFERRED STRATIGRAPHY IS DRAWN AT THE CROSS SECTION LINE (BENT LINE) WITH THE BORINGS PROJECTED ONTO THE CROSS SECTION



VERTICAL EXAGGERATION
2:1

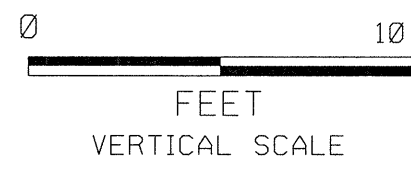
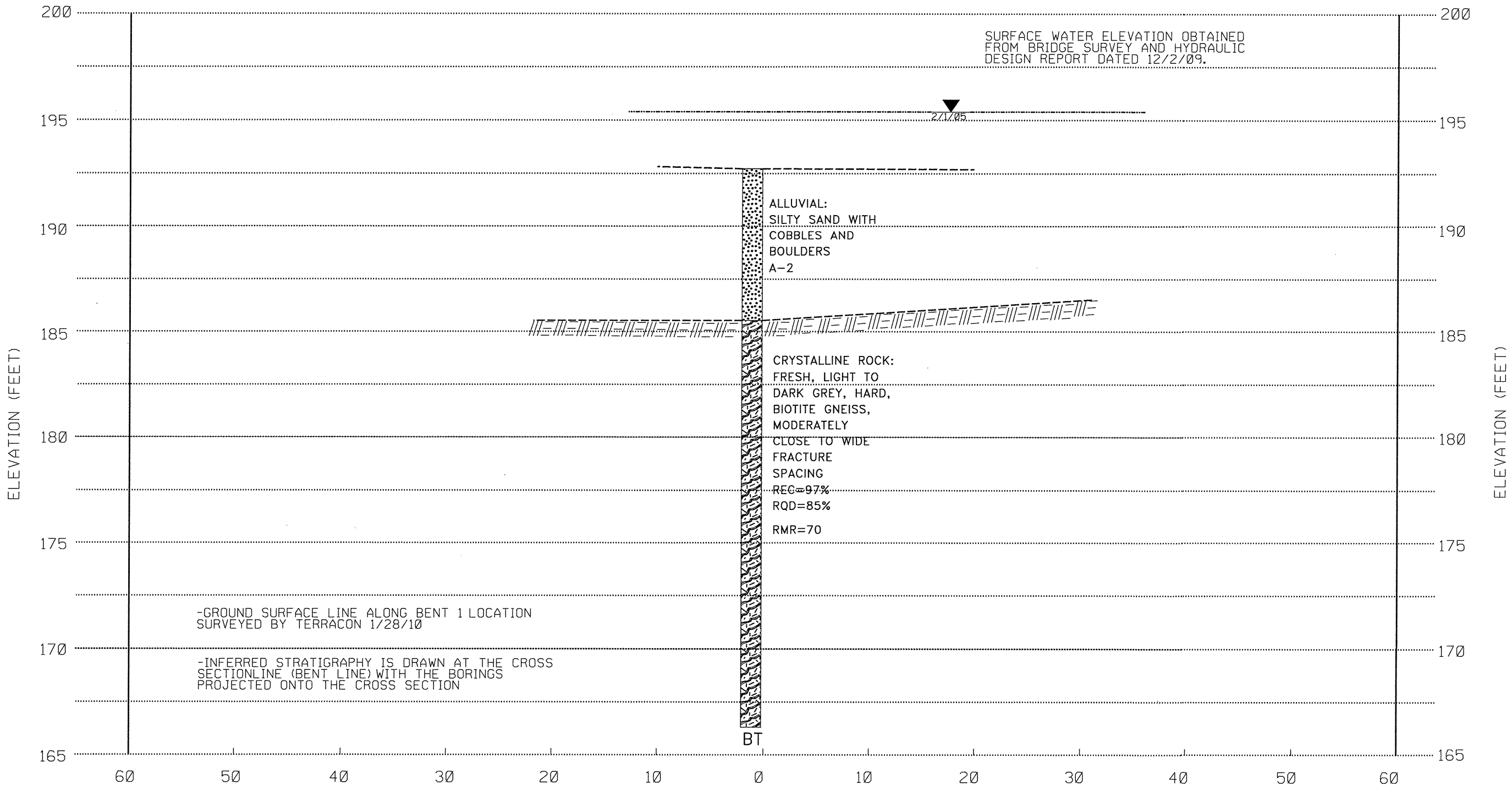


CROSS SECTION-END BENT 1
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
ID: B-4660



REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 5

C OF -L-
B1-A
STATION: 25+17



VERTICAL EXAGGERATION
2:1



CROSS SECTION-BENT 1
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
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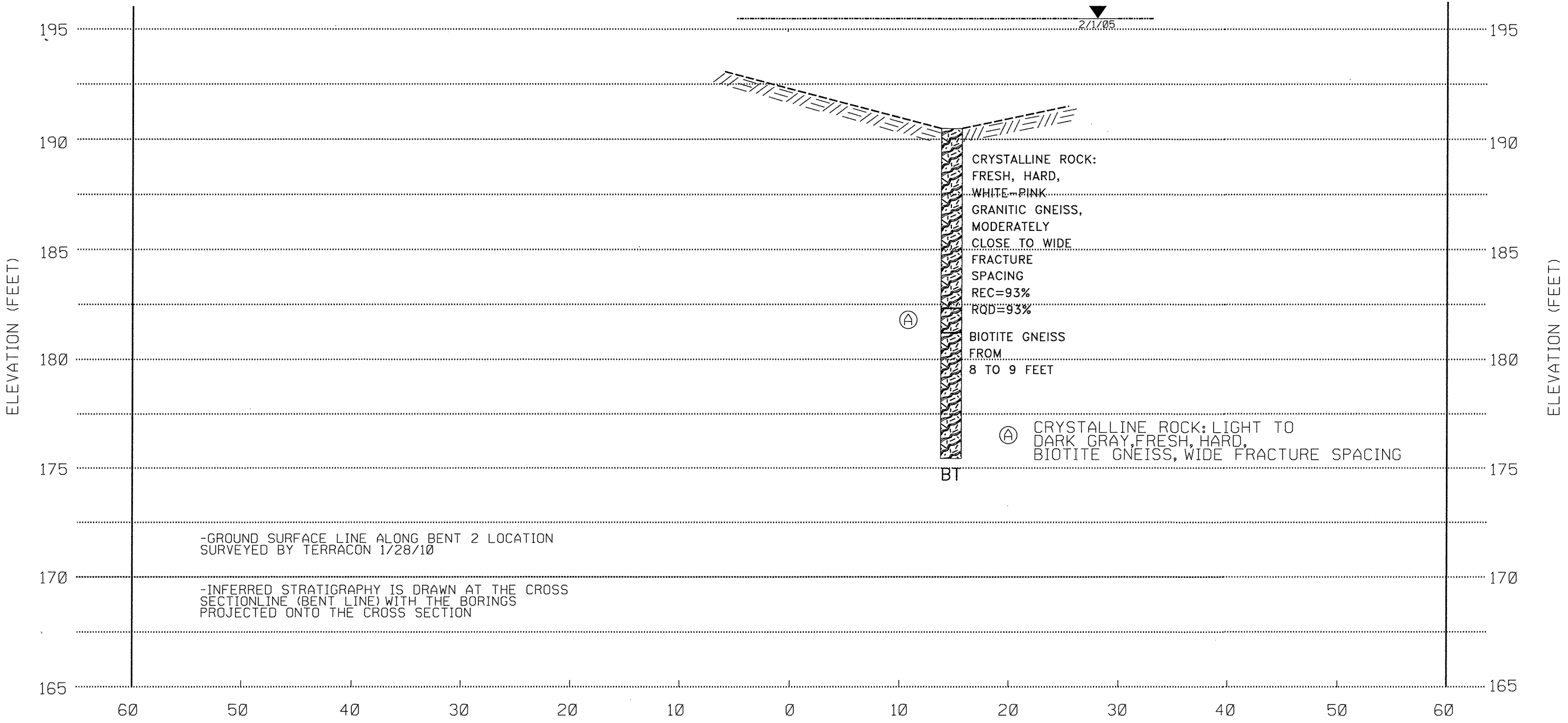


REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 6

1
C OF -L-

B2-B
STATION: 26+20

SURFACE WATER ELEVATION OBTAINED FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 12/2/09.



VERTICAL EXAGGERATION
2:1



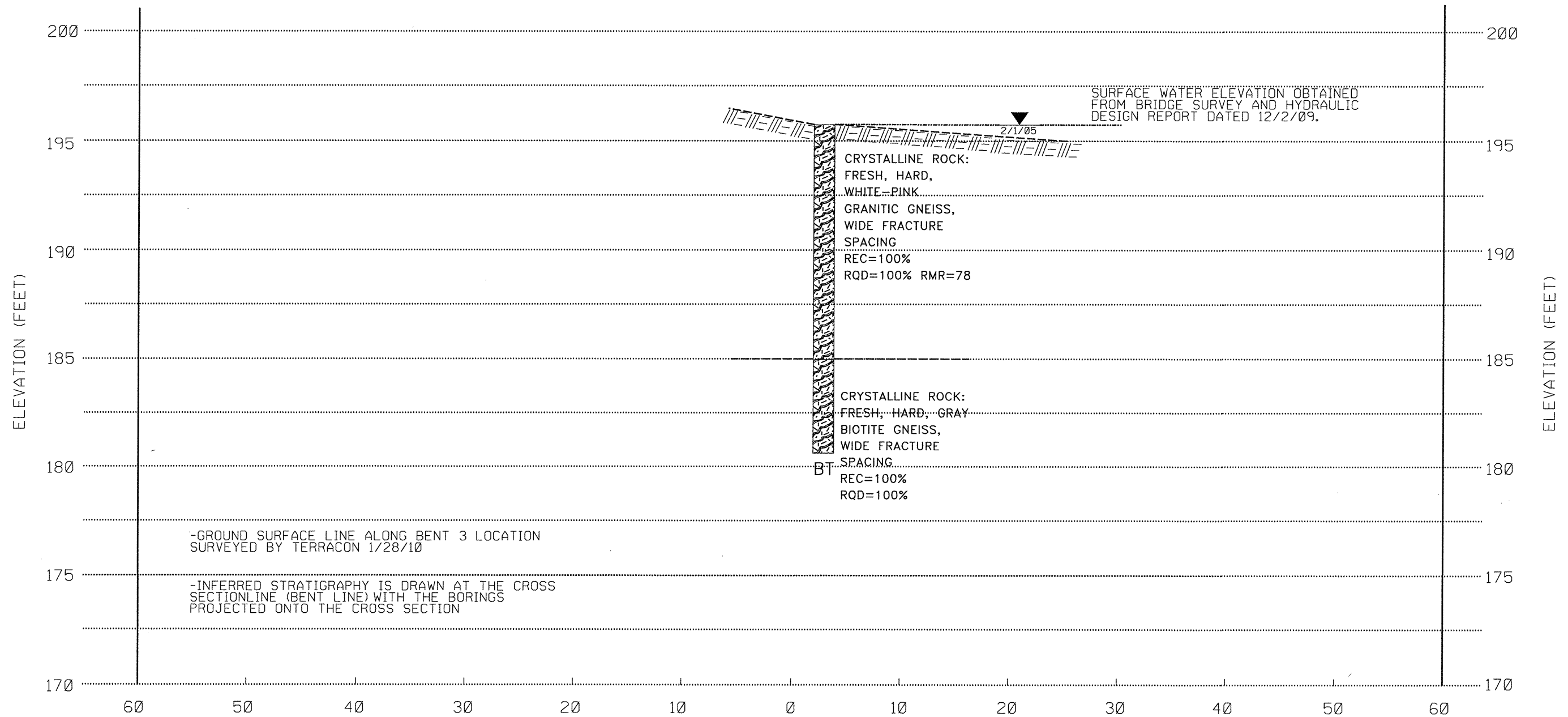
CROSS SECTION- BENT 2
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
ID: B-4660

Terracon

REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 7

|
C OF -L-

B3-B
STATION: 27+20



VERTICAL EXAGGERATION
2:1



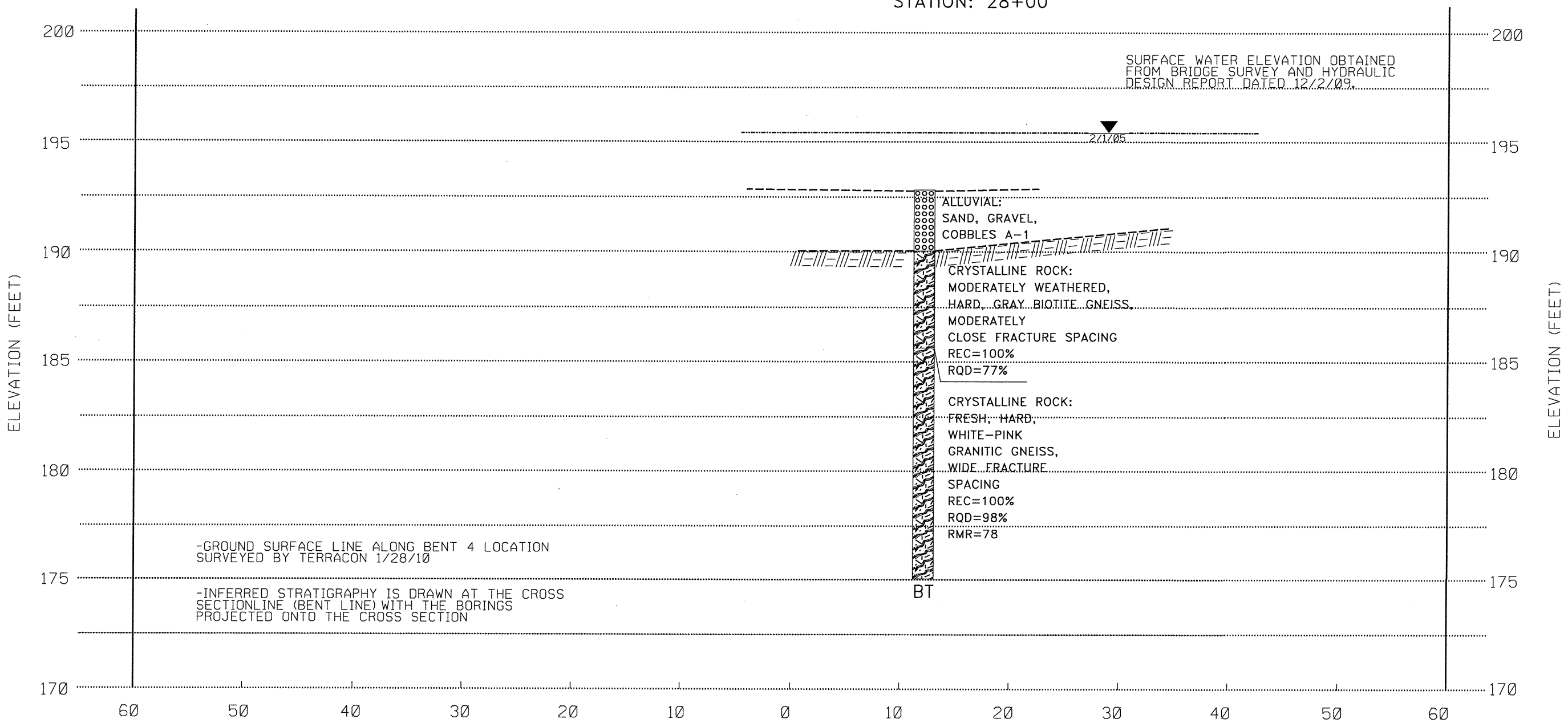
CROSS SECTION- BENT 3
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
ID: B-4660

Terracon

REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 8

|
C OF -L-

B4-B
STATION: 28+00



VERTICAL EXAGGERATION
2:1



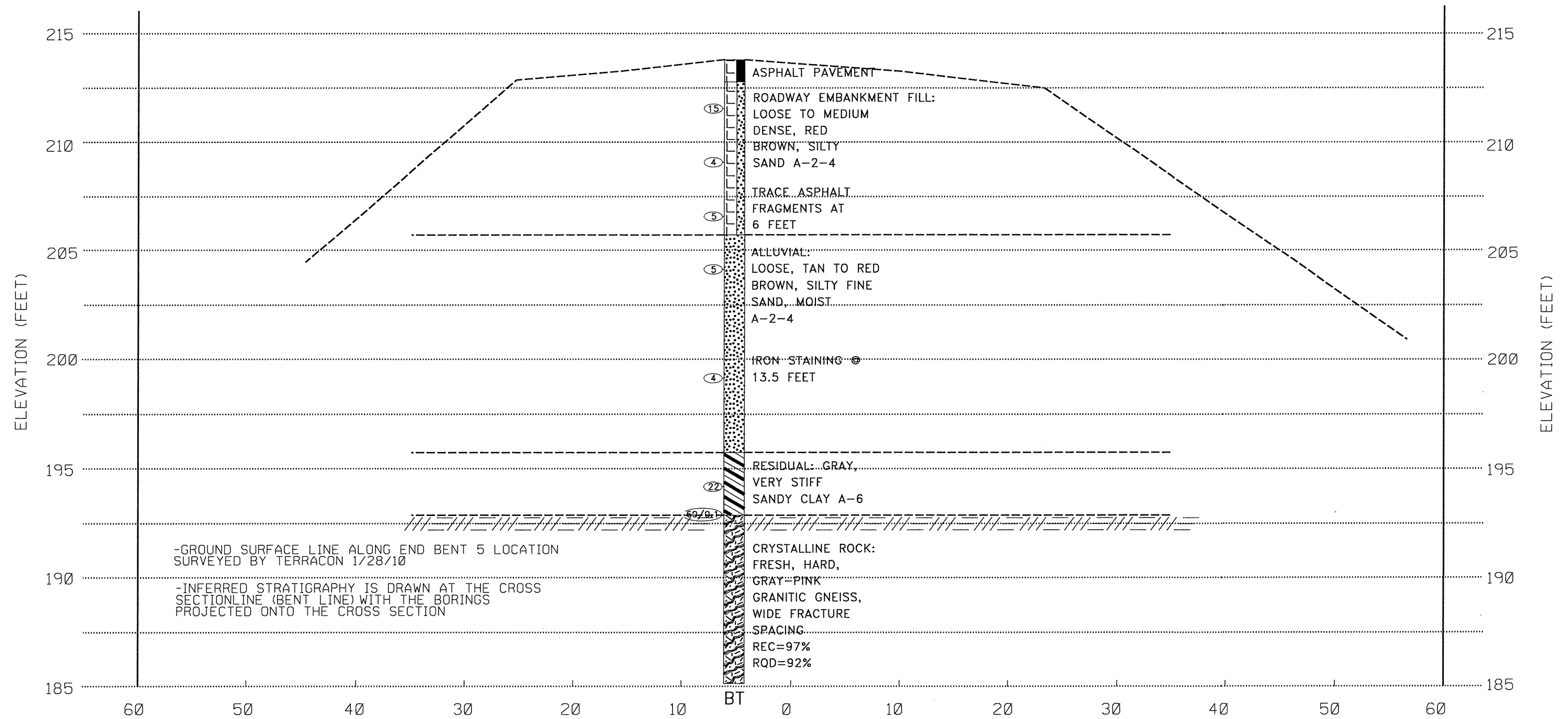
CROSS SECTION-BENT 4
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
ID: B-4660



REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 9

|
C OF -L-

EB2-A
STATION: 29+00



VERTICAL EXAGGERATION
2:1



CROSS SECTION- END BENT 2
BRIDGE NO. 019 OVER THE NEUSE RIVER
ON SR 2000, BETWEEN SR 2006 AND NC 98
NCDOT PROJECT NO. 33822.1.1
ID: B-4660

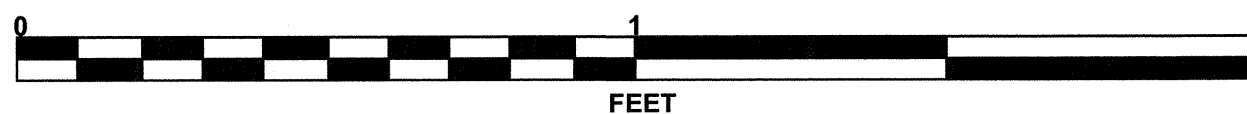
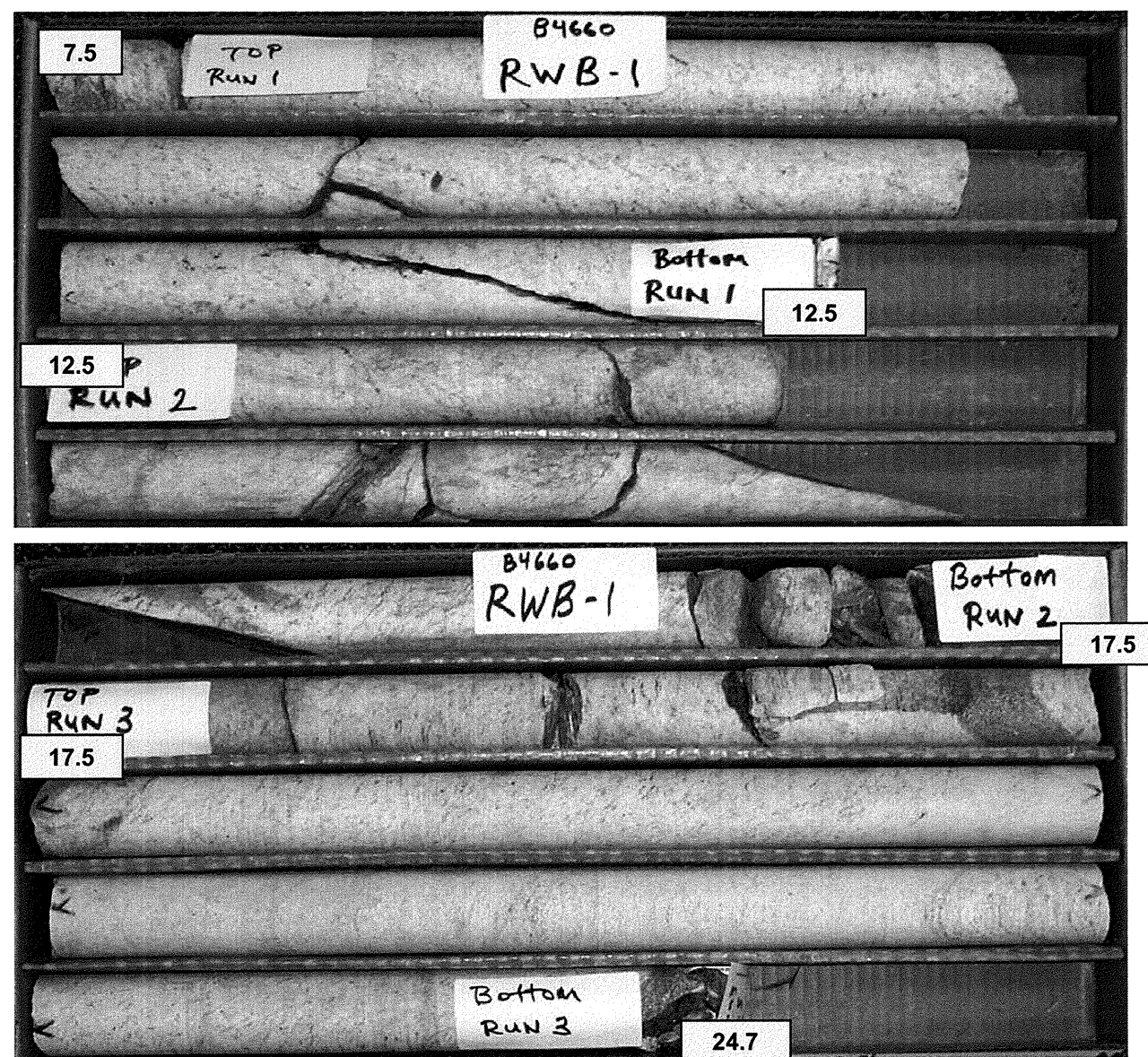
Terracon

REVISIONS	DRAWN: TLY	DATE: 4/23/10
	DFT CHECK: MRF	JOB: B-4660
	ENG CHECK: RLD	DWG: 10

CORE PHOTOGRAPHS

RWB-1

BOXES 1 & 2: 7.5 - 24.7 FEET



PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST A. Ezzell
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. EB1-A	STATION 24+20	OFFSET 21 ft LT	ALIGNMENT -L-
COLLAR ELEV. 212.9 ft	TOTAL DEPTH 24.0 ft	NORTHING 2,124,378	EASTING 797,323
DRILL MACHINE CME-550X	DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 02/08/10	COMP. DATE 02/25/10	SURFACE WATER DEPTH N/A

PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST A. Ezzell
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. EB1-A	STATION 24+20	OFFSET 21 ft LT	ALIGNMENT -L-
COLLAR ELEV. 212.9 ft	TOTAL DEPTH 24.0 ft	NORTHING 2,124,378	EASTING 797,323
DRILL MACHINE CME-550X	DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 02/08/10	COMP. DATE 02/25/10	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
215															
211.9	211.9	1.0												PAVEMENT	0.0
210	209.4	3.5	5	3	3									ASPHALT PAVEMENT - 9"	0.6
	206.9	6.0	1	1	2									ROADWAY EMBANKMENT	2.5
	204.4	8.5	3	2	2									LOOSE, ORANGE-BROWN, SILTY SAND A-2-4	
205	204.4	8.5	3	2	2									ROADWAY EMBANKMENT	7.5
	199.4	13.5	4	2	2									VERY LOOSE, ORANGE-BROWN, CLAYEY SAND, WITH ASPHALT FRAGMENTS/CINDERS, MOIST A-2-4	
														ALLUVIAL	
200														LOOSE, BROWN, SILTY, SAND A-2-4	13.5
														CRYSTALLINE ROCK	13.7
195														FRESH, HARD, GRAY-WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING	
														REC=100% RQD=92%	
190															

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 (%)			
199.2												
	199.2	13.7	5.0		100%	94%		100%	92%		Begin Coring @ 13.7 ft	
195	194.2	18.7	5.3	4:00/1.0	100%	91%					FRESH, HARD, GRAY-WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING	13.7
190	188.9	24.0		8:00/1.0								24.0
185											Note: All Drill rates rounded to nearest minute per foot	
180											Boring Terminated at Elevation 188.9 ft in crystalline rock	
175												
170												
165												
160												
155												
150												
145												
140												
135												

NCDOT BORE DOUBLE B4660_GEO_BRDG_0019_LOGS.GPJ_NC_DOT.GDT_5/12/10

NCDOT CORE SINGLE B4660_GEO_BRDG_0019_LOGS.GPJ_NC_DOT.GDT_5/12/10

CORE PHOTOGRAPHS

EB1-A

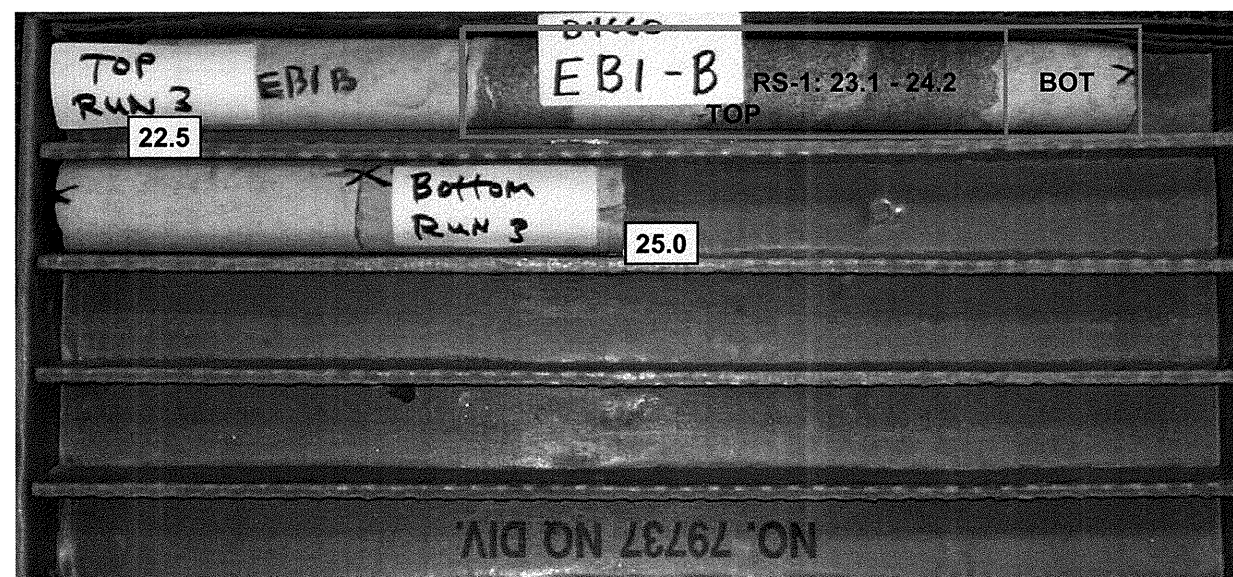
BOXES 1 & 2: 13.7 - 24.0 FEET



CORE PHOTOGRAPHS

EB1-B

BOXES 1 & 2: 15.0 - 25.0 FEET



PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST A. Ezzell
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B1-A	STATION 25+17	OFFSET 1 ft LT	ALIGNMENT -L-
COLLAR ELEV. 192.6 ft	TOTAL DEPTH 26.3 ft	NORTHING 2,124,369	EASTING 797,425
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 02/03/10	COMP. DATE 02/04/10	SURFACE WATER DEPTH 3.3ft

PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST A. Ezzell
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B1-A	STATION 25+17	OFFSET 1 ft LT	ALIGNMENT -L-
COLLAR ELEV. 192.6 ft	TOTAL DEPTH 26.3 ft	NORTHING 2,124,369	EASTING 797,425
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 02/03/10	COMP. DATE 02/04/10	SURFACE WATER DEPTH 3.3ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
195																
													WATER SURFACE (02/03/10)			
													192.6 RIVER BOTTOM	192.6	0.0	
190													ALLUVIAL SILTY SAND WITH COBBLES AND BOULDERS A-2			
185													185.5 CRYSTALLINE ROCK	185.5	7.2	
180													FRESH, HARD, LIGHT TO DARK GRAY, BIOTITE GNEISS, MODERATELY CLOSE TO WIDE FRACTURE SPACING REC=97% RQD=85% RMR=70			
175																
170																
165																
160																
155																
150																
145																
140																
135																
130																
125																
120																
115																
														166.3	26.3	

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	ELEV. (ft)	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)				
192.6													
190	192.6	0.0	2.5	1:00/1.0	(0.5) 20%	(0.0) 0%					River Bottom		
	190.1	2.5	5.0	3:00/1.0	(0.4) 7%	(0.4) 7%					ALLUVIAL SILTY SAND WITH COBBLES AND BOULDERS A-2		
185	185.1	7.5	5.0	3:00/1.0	(4.8) 95%	(2.6) 52%		(18.6) 97%	(16.2) 85%		CRYSTALLINE ROCK	185.5	7.2
											SLIGHTLY WEATHERED TO FRESH, LIGHT TO DARK GRAY, HARD, BIOTITE GNEISS, MODERATELY CLOSE TO WIDE FRACTURE SPACING RMR=70		
180	180.1	12.5	5.0	6:00/1.0	(5.0) 100%	(5.0) 100%	RS-2						
175	175.1	17.5	5.0	7:36/1.0	(5.0) 100%	(4.8) 95%							
170	170.1	22.5	3.8	12:00/1.0	(3.5) 92%	(3.5) 92%							
165	166.3	26.3											
160													
155													
150													
145													
140													
135													
130													
125													
120													
115													

Boring Terminated at Elevation 166.3 ft in crystalline rock
 Note: Began coring at 0.0 feet due to boulders/cobbles within the alluvium

Note: All Drill rates rounded to nearest minute per foot
 Note: Began coring at 0.0 feet due to boulders/cobbles within the alluvium
 Boring Terminated at Elevation 166.3 ft in crystalline rock

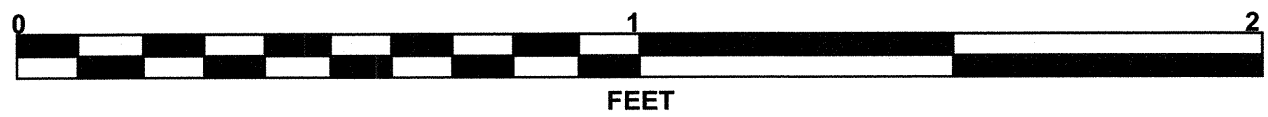
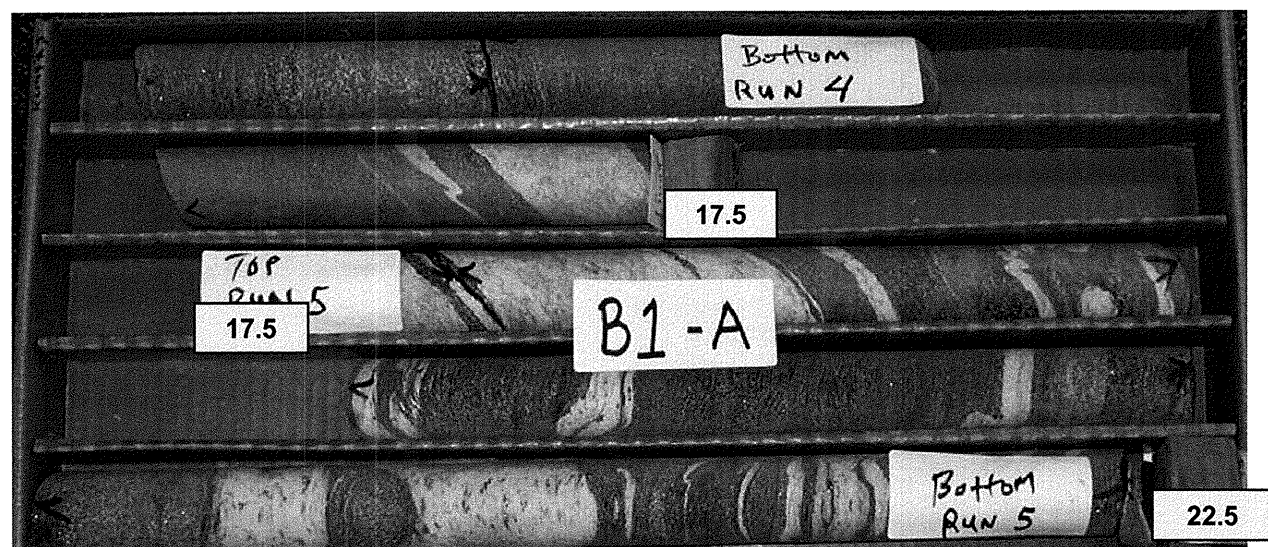
NCDOT BORE DOUBLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT_GDT_5/12/10

NCDOT CORE SINGLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT_GDT_5/12/10

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 0.0 - 22.5 FEET



B1-A

BOX 3: 22.5 - 26.3 FEET



PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST R.L. Denton
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B2-B	STATION 26+20	OFFSET 15 ft RT	ALIGNMENT -L-
COLLAR ELEV. 190.4 ft	TOTAL DEPTH 15.0 ft	NORTHING 2,124,362	EASTING 797,526
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 03/04/10	COMP. DATE 03/04/10	SURFACE WATER DEPTH 2.7ft

PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST R.L. Denton
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B2-B	STATION 26+20	OFFSET 15 ft RT	ALIGNMENT -L-
COLLAR ELEV. 190.4 ft	TOTAL DEPTH 15.0 ft	NORTHING 2,124,362	EASTING 797,526
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 03/04/10	COMP. DATE 03/04/10	SURFACE WATER DEPTH 2.7ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
195																
														WATER SURFACE (03/04/10)		
190														RIVER BOTTOM	190.4	0.0
														CRYSTALLINE ROCK		
														FRESH, HARD, WHITE-PINK GRANITIC GNEISS, MODERATELY CLOSE TO WIDE FRACTURE SPACING		
														REC=98% RQD=93%		
185																
180														BIOTITE GNEISS FROM 8 TO 9 FEET		
175																
170																
165																
160																
155																
150																
145																
140																
135																
130																
125																
120																
115																

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	ELEV. (ft)	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)				
190.4	190.4	0.0	5.0	5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0	(4.8)	(4.3)		(14.7)	(14.0)		River Bottom		
											CRYSTALLINE ROCK		
											FRESH, HARD, WHITE-PINK GRANITIC GNEISS, MODERATELY CLOSE TO WIDE FRACTURE SPACING		
185	185.4	5.0	5.0	5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0	(5.0)	(4.9)							
					100%	97%							
180	180.4	10.0	5.0	5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0 5:00/1.0	(5.0)	(4.9)					BIOTITE GNEISS FROM 8 TO 9 FEET		
					99%	97%							
175	175.4	15.0											
											Note: All Drill rates rounded to nearest minute per foot		
											Boring Terminated at Elevation 175.4 ft in crystalline rock		
170													
165													
160													
155													
150													
145													
140													
135													
130													
125													
120													
115													

NCDOT BORE DOUBLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

NCDOT CORE SINGLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

CORE PHOTOGRAPHS

B2-B

BOXES 1 & 2: 0.0 - 15.0 FEET



PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST R.L. Denton
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B3-B	STATION 27+20	OFFSET 3 ft RT	ALIGNMENT -L-
COLLAR ELEV. 195.7 ft	TOTAL DEPTH 15.0 ft	NORTHING 2,124,332	EASTING 797,622
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 03/02/10	COMP. DATE 03/02/10	SURFACE WATER DEPTH 0.3ft

PROJECT NO. 33822.1.1	ID. B-4660	COUNTY Wake	GEOLOGIST R.L. Denton
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98			GROUND WTR (ft)
BORING NO. B3-B	STATION 27+20	OFFSET 3 ft RT	ALIGNMENT -L-
COLLAR ELEV. 195.7 ft	TOTAL DEPTH 15.0 ft	NORTHING 2,124,332	EASTING 797,622
DRILL MACHINE CME-550X	DRILL METHOD Core Boring	HAMMER TYPE Automatic	
DRILLER T. Gradwell	START DATE 03/02/10	COMP. DATE 03/02/10	SURFACE WATER DEPTH 0.3ft

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					
200															
195														CRYSTALLINE ROCK FRESH, HARD, WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING REC=100% RQD=100% RMR=78	
190														CRYSTALLINE ROCK FRESH, HARD, GRAY BIOTITE GNEISS, WIDE FRACTURE SPACING REC=100% RQD=100%	
185														CRYSTALLINE ROCK FRESH, HARD, GRAY BIOTITE GNEISS, WIDE FRACTURE SPACING REC=100% RQD=100%	
180														Boring Terminated at Elevation 180.7 ft in crystalline rock	

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) %			
195.7		0.0	5.0	3:00/1.0 3:00/1.0 3:00/1.0 5:00/1.0 6:00/1.0	(5.0) 100%	(5.0) 99%		(10.7) 100%	(10.7) 100%		River Bottom	
190	190.7	5.0	5.0	5:00/1.0 4:30/1.0 5:00/1.0 7:00/1.0 8:30/1.0	(5.0) 100%	(5.0) 100%	RS-3				CRYSTALLINE ROCK FRESH, HARD, WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING RMR=78	
185	185.7	10.0	5.0	3:00/1.0 3:00/1.0 3:00/1.0	(5.0) 100%	(5.0) 100%		(4.3) 100%	(4.3) 100%		CRYSTALLINE ROCK FRESH, HARD, GRAY BIOTITE GNEISS, WIDE FRACTURE SPACING	185.0
180	180.7	15.0									Note: All Drill rates rounded to nearest minute per foot Boring Terminated at Elevation 180.7 ft in crystalline rock	180.7

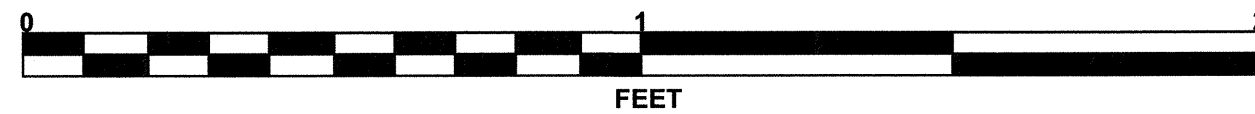
NCDOT BORE DOUBLE B4660_GEO_BROG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

NCDOT CORE SINGLE B4660_GEO_BROG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

CORE PHOTOGRAPHS

B3-B

BOXES 1 & 2: 0.0 - 15.0 FEET



PROJECT NO. 33822.1.1		ID. B-4660		COUNTY Wake		GEOLOGIST R.L. Denton							
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98							GROUND WTR (ft)						
BORING NO. B4-B		STATION 28+00		OFFSET 12 ft RT		ALIGNMENT -L-							
COLLAR ELEV. 192.8 ft		TOTAL DEPTH 17.8 ft		NORTHING 2,124,329		EASTING 797,702							
DRILL MACHINE CME-550X		DRILL METHOD Core Boring		HAMMER TYPE Automatic									
DRILLER T. Gradwell		START DATE 03/05/10		COMP. DATE 03/05/10		SURFACE WATER DEPTH 4.0ft							
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				
195													
													192.8 RIVER BOTTOM 0.0
190													190.0 SAND, GRAVEL, COBBLES A-1 2.8
185													185.6 MODERATELY WEATHERED, HARD, GRAY BIOTITE GNEISS, MODERATELY CLOSE FRACTURE SPACING REC=100% RQD=77% 7.2
180										RS-4			175.0 FRESH, HARD, WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING REC=100% RQD=98% RMR=78 17.8
175													Boring Terminated at Elevation 175.0 ft in crystalline rock Note: Began coring at 0.0 feet due to boulders/cobbles within the alluvium
170													
165													
160													
155													
150													
145													
140													
135													
130													
125													
120													
115													

PROJECT NO. 33822.1.1		ID. B-4660		COUNTY Wake		GEOLOGIST R.L. Denton					
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98							GROUND WTR (ft)				
BORING NO. B4-B		STATION 28+00		OFFSET 12 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 192.8 ft		TOTAL DEPTH 17.8 ft		NORTHING 2,124,329		EASTING 797,702					
DRILL MACHINE CME-550X		DRILL METHOD Core Boring		HAMMER TYPE Automatic							
DRILLER T. Gradwell		START DATE 03/05/10		COMP. DATE 03/05/10		SURFACE WATER DEPTH 4.0ft					
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)			
192.8	192.8	0.0	2.8		(0.0)	(0.0)				River Bottom	
190	190.0	2.8	5.0	4:00/1.0 3:00/1.0 3:00/1.0 5:00/1.0	(5.0) 100%	(4.0) 80%	(4.4) 100%	(3.4) 77%		ALLUVIAL SAND, GRAVEL, COBBLES A-1	2.8
185	185.0	7.8	5.0	3:00/1.0 3:00/1.0 4:00/1.0 5:00/1.0	(5.0) 100%	(4.8) 96%	(10.6) 100%	(10.4) 98%		CRYSTALLINE ROCK MODERATELY WEATHERED, HARD, GRAY BIOTITE GNEISS, MODERATELY CLOSE FRACTURE SPACING	7.2
180	180.0	12.8	5.0	3:00/1.0 4:00/1.0 5:00/1.0 6:00/1.0	(5.0) 100%	(5.0) 100%			RS-4	CRYSTALLINE ROCK FRESH, HARD, WHITE-PINK GRANITIC GNEISS, WIDE FRACTURE SPACING RMR=78	
175	175.0	17.8		4:00/1.0 10:00/1.0 8:00/1.0 10:00/1.0	(5.0) 100%	(5.0) 100%					17.8
170											
165											
160											
155											
150											
145											
140											
135											
130											
125											
120											
115											

Note: All Drill rates rounded to nearest minute per foot
 Note: Began coring at 0.0 feet due to boulders/cobbles within the alluvium
 Boring Terminated at Elevation 175.0 ft in crystalline rock

NCDOT BORE DOUBLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

NCDOT CORE SINGLE B4660_GEO_BRDG_0019_LOGS.GPJ NC_DOT.GDT 6/9/10

CORE PHOTOGRAPHS

B4-B

BOXES 1 & 2: 2.8 - 17.8 FEET



PROJECT NO. 33822.1.1		ID. B-4660		COUNTY Wake		GEOLOGIST R.L. Denton							
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98							GROUND WTR (ft)						
BORING NO. EB2-A		STATION 29+00		OFFSET 5 ft LT		ALIGNMENT -L-							
COLLAR ELEV. 213.7 ft		TOTAL DEPTH 28.6 ft		NORTHING 2,124,300		EASTING 797,799							
DRILL MACHINE CME-550X		DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic								
DRILLER T. Gradwell		START DATE 03/01/10		COMP. DATE 03/04/10		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
215													
	212.7	1.0											213.7 PAVEMENT 0.0
			10	9	6								212.7 ASPHALT PAVEMENT 1.0
210	210.2	3.5											ROADWAY EMBANKMENT LOOSE TO MEDIUM DENSE, RED BROWN, SILTY SAND A-2-4
	207.7	6.0											TRACE ASPHALT FRAGMENTS @ 6 FEET
205	205.2	8.5								SS-5			205.7 ALLUVIAL LOOSE, TAN TO RED BROWN, SILTY FINE SAND A-2-4 8.0
			2	2	3								
200	200.2	13.5											IRON STAINING @ 13.5 FEET
			1	2	2								
195	195.2	18.5											195.7 RESIDUAL GRAY, VERY STIFF, SANDY CLAY A-6 18.0
	193.0	20.7								SS-6			192.9 CRYSTALLINE ROCK FRESH, HARD, GRAY-PINK GRANITE, WITH GNEISS LAYERS, WIDE FRACTURE SPACING REC=97% RQD=92% 20.8
190			60/0.1										
185													185.1 Boring Terminated at Elevation 185.1 ft in crystalline rock 28.6

NCDOT BORE DOUBLE LOGS.GPJ NC_DOT.GDT 5/4/10

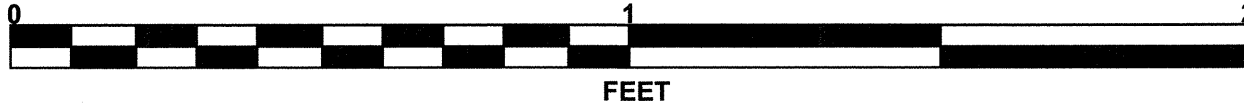
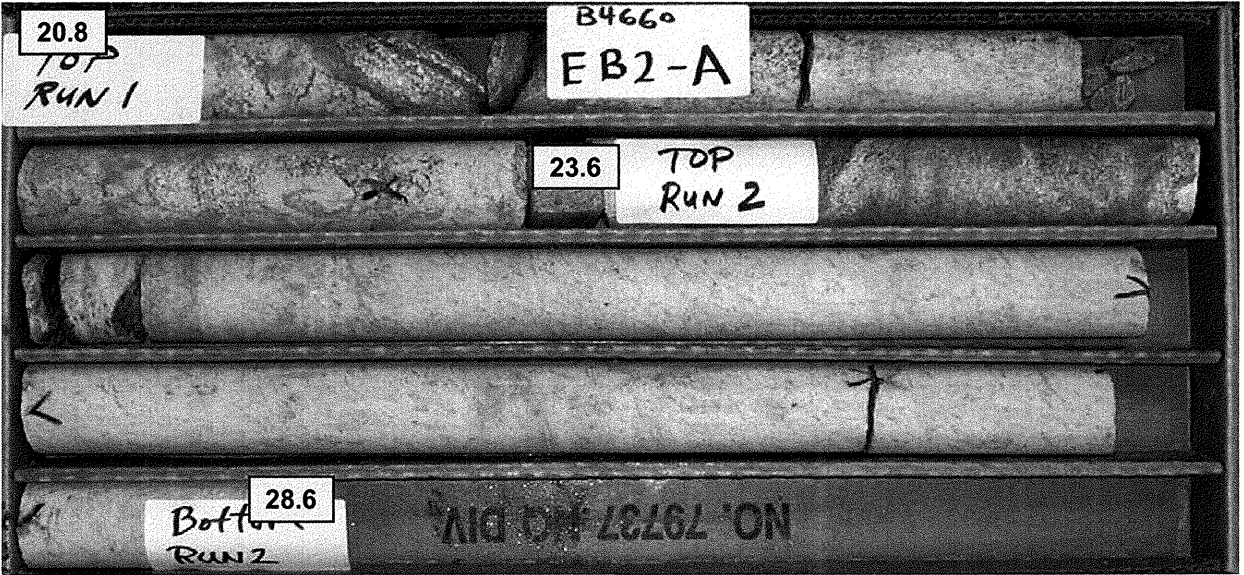
PROJECT NO. 33822.1.1		ID. B-4660		COUNTY Wake		GEOLOGIST R.L. Denton						
SITE DESCRIPTION Bridge No. 019 over Neuse River on SR 2000, between SR 2006 and NC 98							GROUND WTR (ft)					
BORING NO. EB2-A		STATION 29+00		OFFSET 5 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 213.7 ft		TOTAL DEPTH 28.6 ft		NORTHING 2,124,300		EASTING 797,799						
DRILL MACHINE CME-550X		DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic							
DRILLER T. Gradwell		START DATE 03/01/10		COMP. DATE 03/04/10		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
192.9												
	192.9	20.8	2.8	4:00	(2.6)	(2.4)		(7.6)	(7.2)		192.9 Begin Coring @ 20.8 ft CRYSTALLINE ROCK 20.8	
190	190.1	23.6	5.0	4:00	93%	84%		97%	92%		FRESH, HARD, GRAY-PINK GRANITE, WITH GNEISS LAYERS, WIDE FRACTURE SPACING	
				3:00	(5.0)	(4.8)						
				3:00	100%	96%						
185	185.1	28.6		4:00							185.1 Note: All Drill rates rounded to nearest minute per foot* Boring Terminated at Elevation 185.1 ft in crystalline rock 28.6	
				4:00								
180												
175												
170												
165												
160												
155												
150												
145												
140												
135												

NCDOT CORE SINGLE LOGS.GPJ NC_DOT.GDT 5/4/10

CORE PHOTOGRAPHS

EB2-A

BOX 1: 20.8 - 28.6 FEET





REPORT ON SOIL TEST RESULTS

PROJECT:	Bridge No. 019 over the Neuse River on SR 2000, between SR 2006 and NC 98	COUNTY:	Wake
T.I.P. Number	B-4660	DATE REPORTED:	March 18, 2010
LABORATORY:	Terracon Consultants, Inc. – Raleigh Laboratory		

TEST RESULTS

Boring No.	RW B1	EB 1A	EB 1B	EB 1B	EB 2A	EB 2A		
Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6		
Retained #4 Sieve %	0	12	11	10	6	2		
Passing #10 Sieve %	98	82	83	88	90	98		
Passing #40 Sieve %	90	67	67	72	71	85		
Passing #200 Sieve %	39	22	19	21	29	42		

MINUS #10 FRACTION

Soil Mortar - 100%								
Coarse Sand -Ret. #60	22.8	36.7	38.0	38.3	36.6	18.5		
Fine Sand - Ret. #270	42.6	41.3	42.6	42.7	36.3	44.4		
Silt 0.05-0.005 mm %	10.7	10.6	4.3	8.4	10.6	14.0		
Clay < 0.005 mm %	23.9	11.4	15.1	10.6	16.5	23.1		
Passing # 40 Sieve %								
Passing # 200 Sieve %								

Liquid Limit	29	20	19	20	19	33		
Plastic Index	10	NP	NP	NP	NP	15		
AASHTO Classification	A-4 (1)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-2-4 (0)	A-6 (3)		
Select Granular Class Type								
Station	23+75	24+20	24+20	24+20	29+00	29+00		
Hole No.	RW B1	EB 1A	EB 1B	EB 1B	EB 2A	EB 2A		
Depth (ft) From:	3.5	6.0	1.0	8.5	6.0	18.5		
To:	5.0	7.5	2.5	10.0	7.5	20.0		

Remarks:

Submitted By: Stephanie E. Hardison
 Stephanie E. Hardison
 Cert. No. 114-01-1203

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 33822.1.1

F.A. NO.: BRSTP-2000(4)

COUNTY: WAKE

BRIDGE NO. 019 OVER NEUSE RIVER ON SR 2000, BETWEEN SR 2006 AND NC 98

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (KSI)	Young's Modulus (MPSI)	Splitting Tensile Strength (PSI)	Remarks
RS-1 (bot)	EB1-B	23.1-24.2	Gneiss	Czlg	100	4.98	1.999	138.3	20.9	5.35	n/a	
RS-1 (top)	EB1-B	23.1-24.2	Gneiss	Czlg	100	4.18	1.999	163.5	9.8	4.94	n/a	
RS-2	B1-A	13.7-14.4	Gneiss	CZlg	100	3.97	1.875	182.8	10.3	7	n/a	
RS-3	B3-B	6.2-6.9	Gneiss	Czlg	97	4.35	1.999	149.4	28.8	5.51	n/a	
RS-4	B4-B	8.8-9.7	Gneiss	Czlg	96	4.05	1.999	160.4	23.7	5.32	n/a	



**FIELD
 SCOUR REPORT**

WBS: 33822.1.1 TIP: B-4660 COUNTY: Wake

DESCRIPTION(1): Bridge No. 019 on SR 2000 (Falls of Neuse Rd.) over The Neuse River

EXISTING BRIDGE

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

Bridge No.: 19 Length: 403 Total Bents: 13 Bents in Channel: 11 Bents in Floodplain: 13
 Foundation Type: appear to be spread footings supported on bedrock,

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: none observed

Interior Bents: Appear to be supported directly on crystalline bedrock, so no scour problems.

Channel Bed: Mostly bedrock across channel. It appears there is a very thin veneer of bedding material at south end of the bridge, which likely migrates depending on flow conditions from Falls Dam.

Channel Bank: Generally looks ok. Some tree roots exposed on south bank but the banks also have a substantial amount of natural boulder protection

EXISTING SCOUR PROTECTION

Type(3): Rip Rap/ Natural Boulders

Extent(4): End bent slopes extending into stream channel and around wingwalls and onto channel bank

Effectiveness(5): satisfactory; no undermining observed. Natural boulders provide additional protection on banks

Obstructions(6): Channel appears to be free flowing between bents, though there are boulders scattered about.

INSTRUCTIONS

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

DESIGN INFORMATION

Channel Bed Material(7): Silty Sand with cobbles and boulders A-2-4 where encountered. Mostly crystalline bedrock.

Channel Bank Material(8): Silty Sand and Gravels; appears moist and relatively dense

Channel Bank Cover(9): natural boulders and trees (sycamore and river birch), natural grasses

Floodplain Width(10): approx 450 feet

Floodplain Cover(11): Native grasses and weeds.

Stream is(12): Aggrading _____ Degrading _____ Static

Channel Migration Tendency(13): not likely due to confinement by rock outcrops and proximity to Falls Dam

Observations and Other Comments: 3 interior bents are stone masonry and 8 bents are concrete

Reported by: Date: 3/30/2010
 R.L. Denton, II, P.E.

DESIGN SCOUR ELEVATIONS(14)

Feet _____ Meters _____

BENTS

	B1	B2	B3	B4								
	188.6	187.8	192.4	187.7								

Comparison of DSE to Hydraulics Unit theoretical scour:
 The Geotechnical Unit concurs with the Hydraulics Unit's scour evaluation.

DSE determined by: William F. Goforth, P.G. Date: 4/22/2010

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

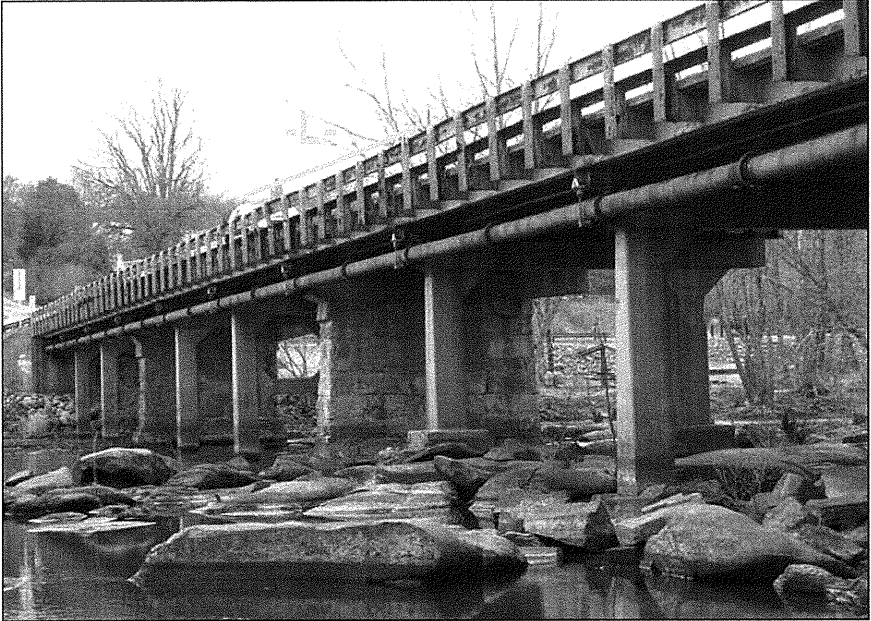
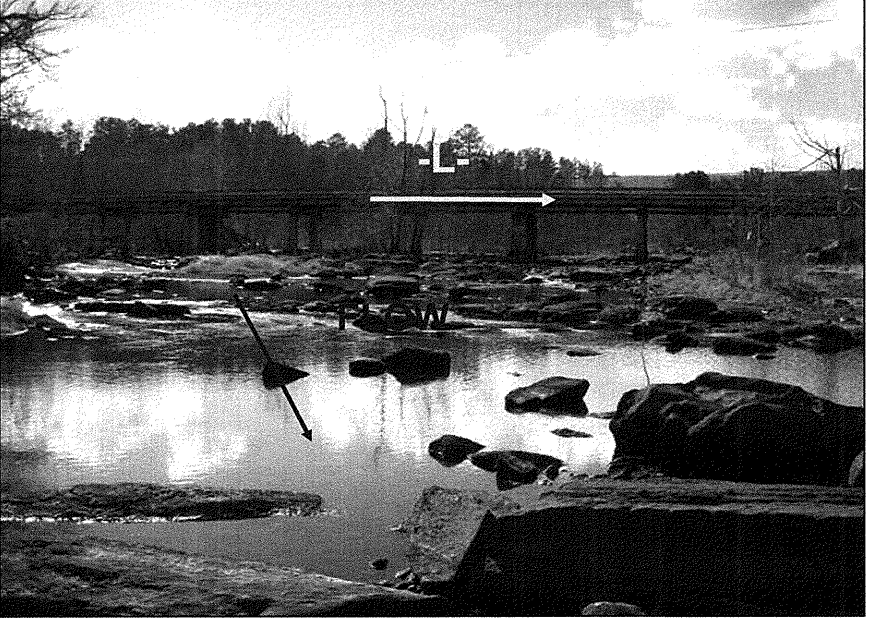
Bed or Bank	Bank	Bank	Bank	Bank			
Sample No.	SS-1	SS-3	SS-6	SS-5			
Retained #4	12	10	0	2			
Passed #10	82	88	98	98			
Passed #40	67	72	90	85			
Passed #200	22	21	39	42			
Coarse Sand	36.7	38.3	22.8	18.5			
Fine Sand	41.3	42.7	42.6	44.4			
Silt	10.6	8.4	10.7	14			
Clay	11.4	10.6	23.9	23.1			
LL	20	20	29	33			
PI	NP	NP	10	15			
AASHTO	A-2-4 (0)	A-2-4 (0)	A-4 (1)	A-6 (3)			
Station	24+20	24+20	23+75	29+00			
Offset	21' L	5' R	27' R	5' L			
Depth	8.5 ft	8.5 ft	3.5 ft	18.5 ft			

SITE PHOTOGRAPHS

VIEW FROM FALLS DAM LOOKING EAST



EAST SIDE OF BRIDGE



VIEW OF EXISTING WATERLINE, LOOKING SOUTH. NOTE BOULDERS IN FOREGROUND



VIEW OF TYPICAL STONE MASONRY SUPPORT