

CONTRACT: 33597.1.1 ID: B-4255

# STATE OF NORTH CAROLINA

## DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT

# STRUCTURE SUBSURFACE INVESTIGATION

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4255	1	28
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33597.1.1		P.E.	
		CONST.	

#### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

STATE PROJECT 33597.1.1 I.D. NO. B-4255

F.A. PROJECT 999

COUNTY ROWAN

PROJECT DESCRIPTION BRIDGE NO. 28  
ON NC 801 OVER WITHROW CREEK

SITE DESCRIPTION \_\_\_\_\_

INVESTIGATED BY J.P. ROGERS PERSONNEL R.W. TODD

CHECKED BY C.B. LITTLE J.K. STICKNEY

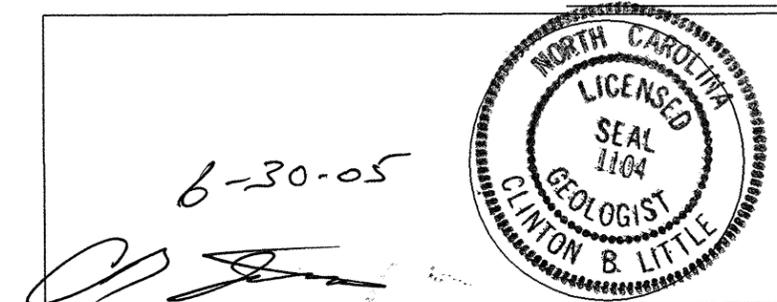
SUBMITTED BY C.B. LITTLE G.L. SMITH

DATE 06/2005 M.L. SMITH

DRAWN BY: JP ROGERS/JK McCLURE

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 UNIT**

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4255	33597.1.1	2	28

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																																																														
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p align="center"><i>VERY STIFF, GRAIN SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>		<p>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)</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (R.Q.D.) - 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.</p> <p>SAPROLITE (SAP) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																														
<p align="center"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (&lt;35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (&gt;35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4-1</td> <td>A-4-2</td> <td>A-4-3</td> <td>A-4-4</td> <td>A-4-5</td> <td>A-4-6</td> <td>A-4-7</td> <td>A-4-8</td> <td>A-4-9</td> <td>A-4-10</td> </tr> <tr> <td>SYMBOL</td> <td></td> </tr> <tr> <td>% PASSING</td> <td>100</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>0-5</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>0-5</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="3">FAIR TO POOR</td> <td colspan="3">POOR</td> <td colspan="3">UNSATURABLE</td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td colspan="6">EXCELLENT TO GOOD</td> <td colspan="6">FAIR TO POOR</td> <td colspan="3">POOR</td> <td colspan="3">UNSATURABLE</td> </tr> </table> <p align="center">P.I. OF A-7-5 ≤ LL - 30 ; P.I. OF A-7-6 &gt; LL - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (<35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)							ORGANIC MATERIALS			A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	A-1, A-2	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4-1	A-4-2	A-4-3	A-4-4	A-4-5	A-4-6	A-4-7	A-4-8	A-4-9	A-4-10	SYMBOL																	% PASSING	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	LIQUID LIMIT	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	PLASTIC INDEX	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		FAIR TO POOR			POOR			UNSATURABLE			GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						POOR			UNSATURABLE			<p align="center"><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p align="center"><b>WEATHERING</b></p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>SEVERE (SEV) - ALL ROCKS 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.</p> <p>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.</p> <p>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.</p>		<p align="center"><b>ROCK HARDNESS</b></p> <p>VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>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.</p> <p>SOFT - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>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.</p>	
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<p align="center"><b>COLOR</b></p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>		<p align="center"><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																																																																																																		
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MIKE F. EASLEY  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT  
SECRETARY

June 29, 2005

STATE PROJECT: 33597.1.1  
I.D. : B-4255  
COUNTY: Rowan  
DESCRIPTION: Bridge No. 028 over Brown Creek on US 74 WBL  
SUBJECT: Geotechnical Report - Bridge Foundation Investigation

**SITE DESCRIPTION AND GEOLOGY**

The site is located in northwestern Rowan County, near the town of Cleveland. The proposed replacement structure will be a concrete deck on reinforced concrete box girders with one span of 55.0', one span of 75.00', and one span of 35.0'. The skew is approximately 75 degrees to line -L- (NC 801). The new structure will be in the same location as the existing structure. The benchmark (BL #3, elev. 680.64') used to survey our collar elevations is located at 24+99.23 -BL-, centerline. The scope of this project will also include a detour structure. This structure will be constructed downstream of existing Bridge No. 28.

The Geotechnical Unit performed a total of 3 Standard Penetration Test (SPT) borings and 4 core borings at this site. All core borings were advanced with water using either a tri-cone bit or NX wireline (core). The SPT borings were made with 6" hollow stem augers. The predominant rock type encountered in our core borings was gray/white to gray/brown, gabbro. Three rock core samples were submitted to the rock lab where they will be tested for Unit Weight, Compressive Strength, and Young's Modulus. At the time of this writing, these samples are currently being tested.

**FOUNDATION SUMMARY**

**End Bent One (EB1)**

Roadway fill soils encountered at this location are approximately 14.0' thick and consist of soft to stiff sandy clay (A-6). Alluvial soils encountered at this location are approximately 15.0' thick and consist of soft to stiff sandy clay (A-6) with gravel and medium dense silty sand (A-2-4) with gravel. Residual soils were not encountered at this location.

Weathered rock was encountered near elevation 652.50' in the boring performed at EB1-A. Hard, crystalline rock (tri-cone bit refusal) was encountered across the bent near elevation 644.00'. At the time of our investigation, the 24-hour groundwater level was near elevation 664.00' across the bent.

**Interior Bent One (B1)**

Alluvial soils encountered at this location are 17.0' to 18.0' thick and consist of very loose to loose silty sand (A-2-4). Residual soils encountered at this bent are approximately 4.00' - 7.00' thick and consist of dense coarse sand (A-2-4) and hard sandy silt (A-4). Roadway fill soils were not encountered at this location.

Weathered, crystalline rock was encountered between elevation 645.00' - 648.50' across this bent. Hard, crystalline rock (auger refusal) is present on this bent between elevation 644.00' - 647.50'. Rock core retrieved at this location consisted of moderately severe to slightly weathered and medium hard to hard gabbro. RQD's are between 31% and 81%. The 24-hour groundwater level was between elevations 661.60' and 663.00' along this bent. Please refer to the appropriate corelog and cross-section for a detailed, run-by run analysis of the core retrieved at this location.

**Interior Bent Two (B2)**

Approximately four to five feet of riprap boulders have been placed along the entire length of this location. The riprap ranges in size from one foot in diameter to 3x3 boulders. Alluvial soils encountered are approximately nine feet thick and consist of very loose to loose silty sand (A-2-4). Residual soils encountered at this bent are approximately 3.00' thick and consist of very stiff to hard, clayey silt (A-4) and loose silty sand (A-2-4). Roadway fill soils were not encountered at this location.

Weathered, crystalline rock was encountered near elevation 651.40' in the boring performed at B2-A. Hard, crystalline rock (auger refusal) is present on this bent between elevation 647.00' - 651.90'. Rock core retrieved at this location consisted of moderately severe to slightly weathered and medium hard to hard gabbro. RQD's are between 14% and 100%. The 24-hour groundwater level was near elevation 662.00' along this bent. Please refer to the appropriate corelog and cross-section for a detailed, run-by run analysis of the core retrieved at this location.

**End Bent Two (EB2)**

Roadway fill soils encountered at this location are approximately 14.00' thick and consist of soft to medium stiff sandy clay (A-6). Alluvial soils on this bent are 10.00' thick and consist of very loose to loose silty sand (A-2-4). Residual soils are approximately five feet thick and consist of medium dense to dense silty sand (A-2-4).

Weathered rock was encountered across this bent near elevation 652.40'. Hard, crystalline rock (tri-cone bit refusal) was not encountered at this location. The 24-hour groundwater level was near elevation 663.40' along this bent.

Respectfully submitted,

J. P. Rogers  
Project Engineering Geologist  
Geotechnical Engineering Unit - Harrisburg Field Office

cc: Pat Ivey, PE  
Division 09 Engineer

**DATUM DESCRIPTION**

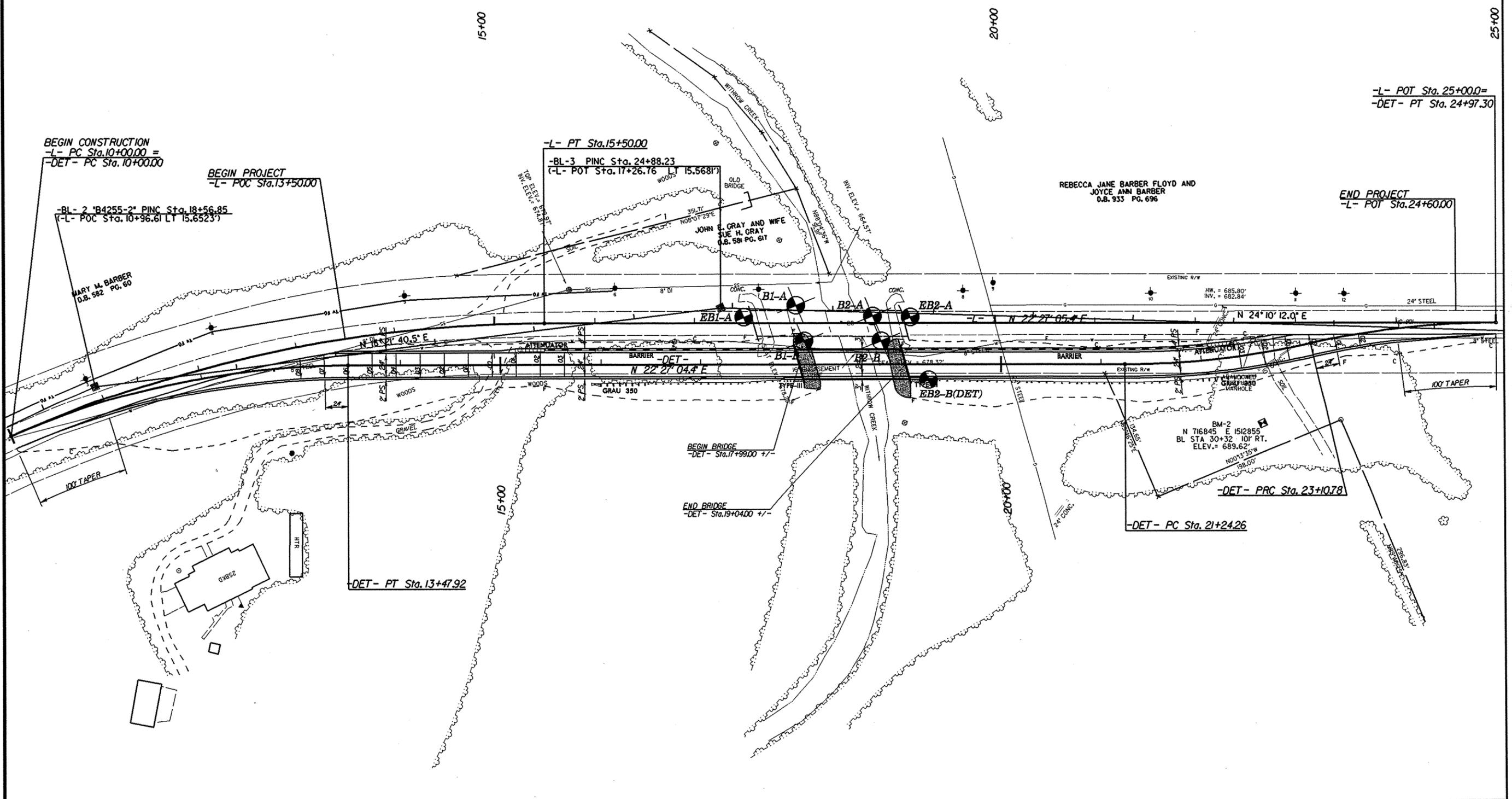
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B4255-1" WITH NAD 83/94 STATE PLANE GRID COORDINATES OF NORTHING: 714,426.1892(6) EASTING: 1,512,424.7540(6) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999874950 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B4255-1" TO -L- STATION 10+00.00 IS N 1° 40' 13.5" E 1,259.0722' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 88 HARN

-L-		-DET-	
PI Sta 12+79.05	PI Sta 11+76.52	PI Sta 22+17.91	PI Sta 24+04.43
$\Delta = 23^\circ 52' 24.3"$ (RT)	$\Delta = 23^\circ 52' 23.3"$ (RT)	$\Delta = 12^\circ 47' 53.7"$ (LT)	$\Delta = 12^\circ 47' 54.8"$ (RT)
D = 4' 20" 26.1"	D = 6' 51" 42.4"	D = 6' 51" 42.4"	D = 6' 51" 42.3"
L = 550.00'	L = 347.92'	L = 186.52'	L = 186.52'
T = 279.05'	T = 176.52'	T = 93.65'	T = 93.65'
R = 1,320.00'	R = 835.00'	R = 835.00'	R = 835.00'
SE = 06	SE = 06	SE = 06	SE = 06
DS = 60 mph	DS = 50 mph	DS = 50 mph	DS = 50 mph

NC GRID NAD 83

PROJECT REFERENCE NO. <b>B-4255</b>	SHEET NO. <b>4</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	

4/28



BEGIN CONSTRUCTION  
-L- PC Sta. 10+00.00 =  
-DET- PC Sta. 10+00.00

BEGIN PROJECT  
-L- POC Sta. 13+50.00

-BL- 2 "B4255-2" PINC Sta. 18+56.85  
(-L- POC Sta. 10+96.61 LT 15.6523')

-L- PT Sta. 15+50.00

-BL-3 PINC Sta. 24+88.23  
(-L- POT Sta. 17+26.76 LT 15.5681')

REBECCA JANE BARBER FLOYD AND  
JOYCE ANN BARBER  
D.B. 933 PG. 696

END PROJECT  
-L- POT Sta. 24+60.00

-L- POT Sta. 25+00.0 =  
-DET- PT Sta. 24+97.30

BEGIN BRIDGE  
-DET- Sta. 17+99.00 +/-

END BRIDGE  
-DET- Sta. 19+04.00 +/-

BM-2  
N 716845 E 1512855  
BL STA 30+32 101' RT.  
ELEV. = 689.62'

-DET- PRC Sta. 23+10.78

-DET- PC Sta. 21+24.26

-DET- PT Sta. 13+47.92

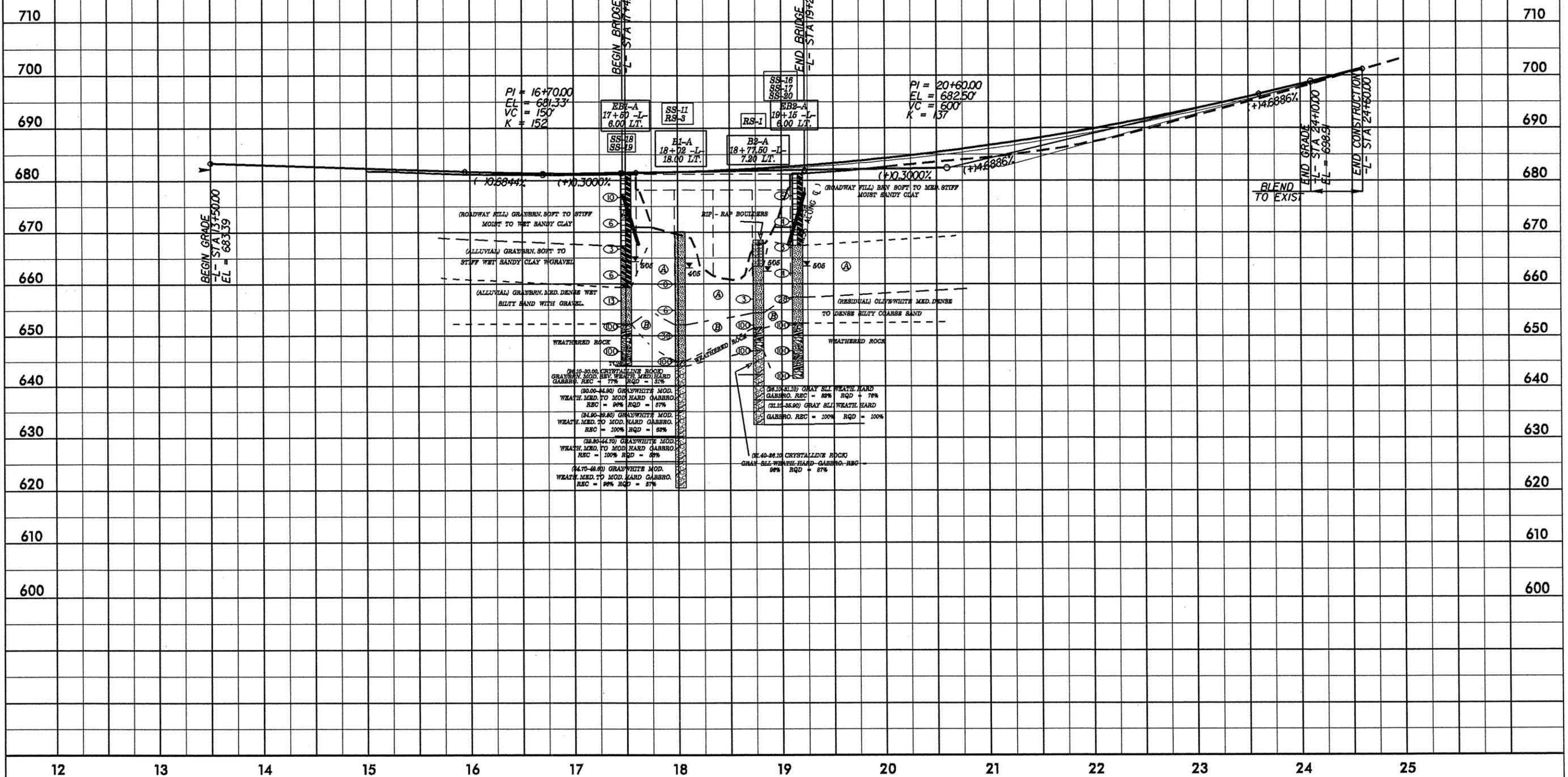
-BL-2  
EL = 685.69  
18" REBAR WITH CAP

-BL-3  
EL = 680.64  
18" REBAR WITH CAP

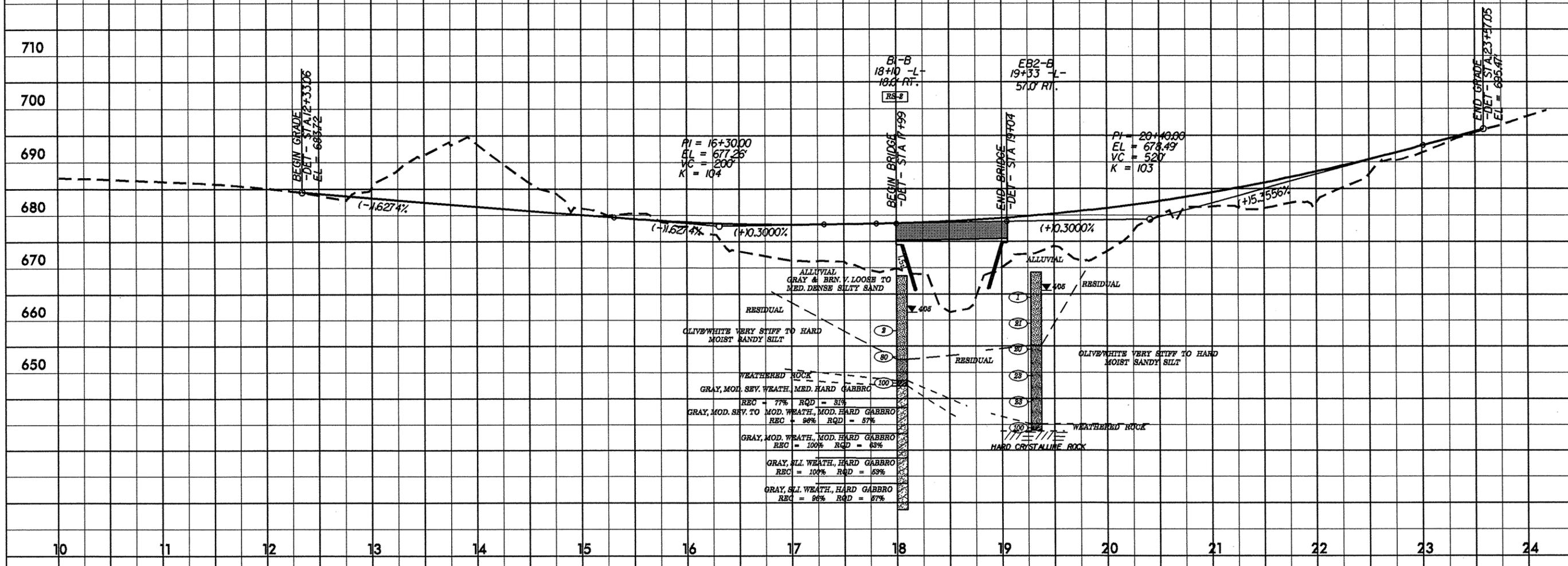
BM-2 EL = 689.62  
M=716345 E=1512855  
-BL- STA 30+32 10' RT  
-L- STA 22+66.88 102.3843' RT  
RAILROAD SPIKE SET IN BASE  
OF 2" OAK TREE.

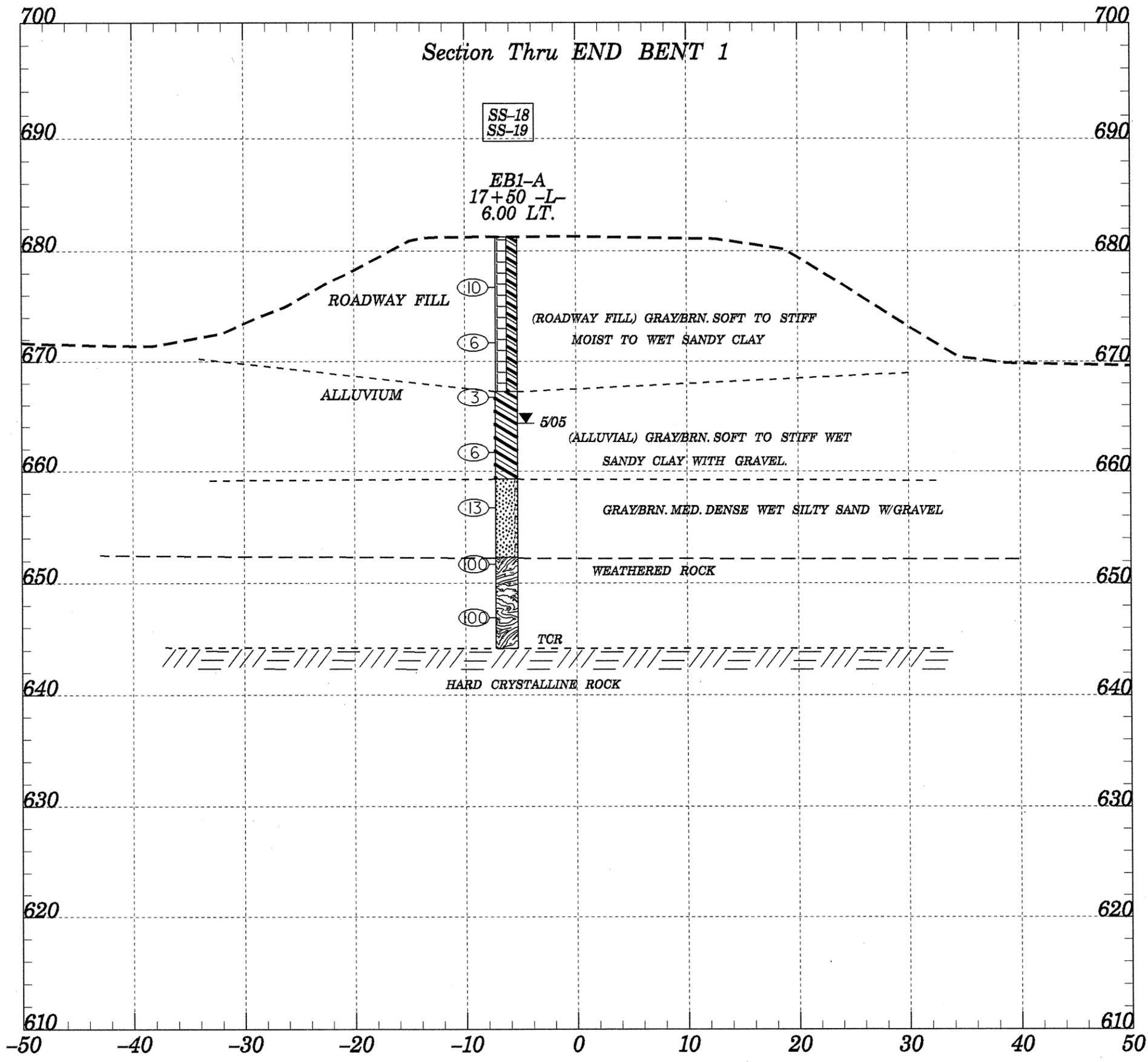
DESIGN DISCHARGE	= 6800 CFS
DESIGN FREQUENCY	= 50 YRS
DESIGN HW ELEVATION	= 675.19 FT
100 YEAR DISCHARGE	= 8100 CFS
100 YEAR HW ELEVATION	= 675.93 FT
OVERTOPPING DISCHARGE	= 18400 CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 681.38 FT
DATE OF SURVEY	= ??
W.S. ELEVATION AT DATE OF SURVEY	= 662.13 FT

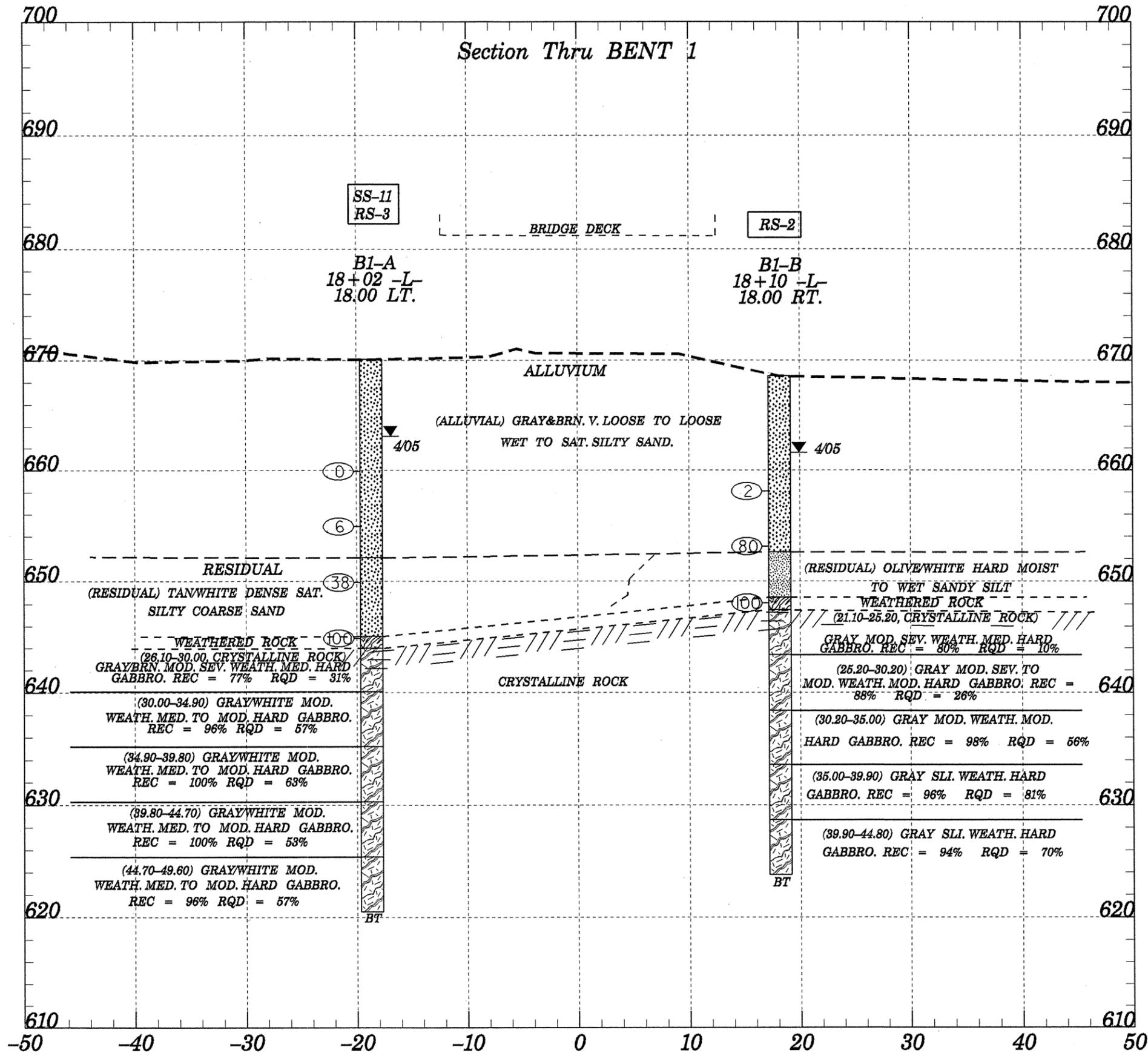
- Ⓐ (ALLUVIAL) GRAY&BRN. V. LOOSE TO LOOSE SAT. SILTY SAND.
- Ⓑ (RESIDUAL) TAN/WHITE TO OLIVE LOOSE TO DENSE MOIST TO SAT. SILTY COARSE SAND

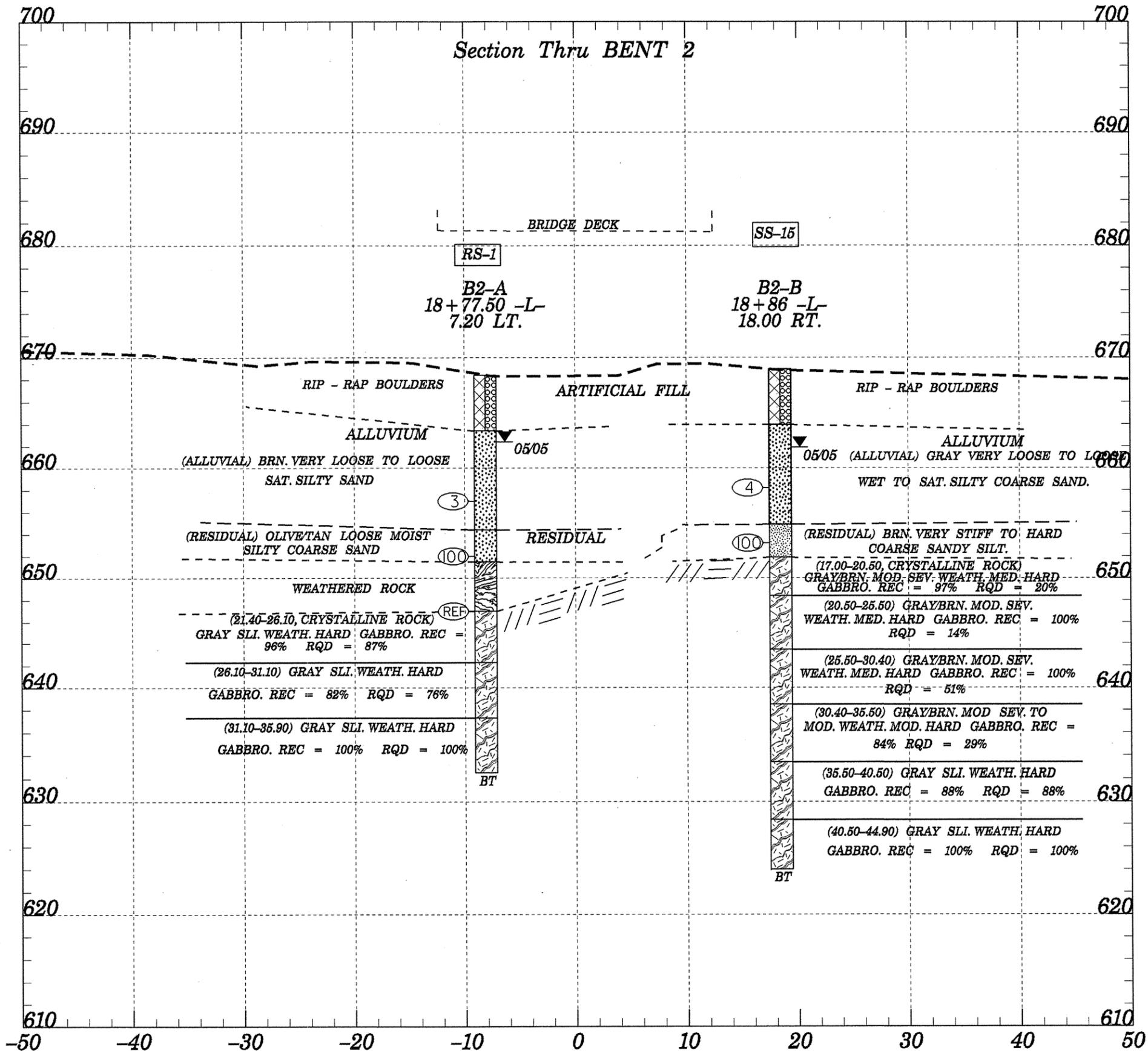


### DETOUR BRIDGE PROFILE

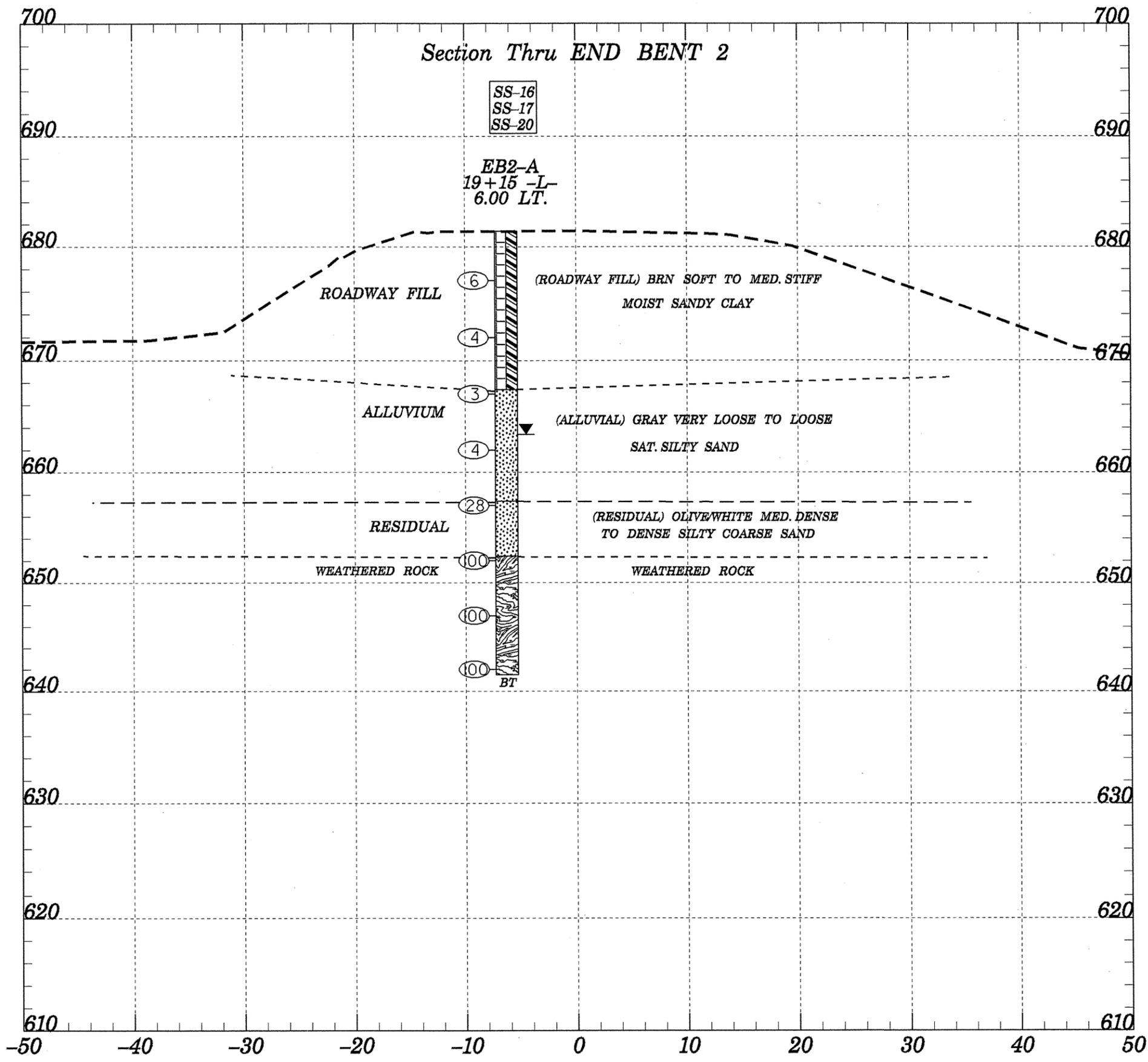








PROJECT REFERENCE NO. <b>B-4255</b>	SHEET NO. <b>10</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
10/24	



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33597.1.1		ID B-4255		COUNTY ROWAN		GEOLOGIST RW TODD							
SITE DESCRIPTION BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK							GND WATER						
BORING NO EB1-A		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 17+50.000		OFFSET 6.00ft LT		24 HR 17.00ft							
COLLAR ELEV 681.30ft		TOTAL DEPTH 37.10ft		START DATE 5/11/05		COMPLETION DATE 05/11/05							
DRILL MACHINE CME-550			DRILL METHOD NWCAS/TRI-CONE			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK 37.10ft			Log EB1-A, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
681.30													
	4.60	5	5	5	1.0		10						(ROADWAY FILL) GRAY/BRN. SOFT TO STIFF MOIST TO WET SANDY CLAY
	9.60	3	3	3	1.0		6						
670.00													
	14.60	1	2	1	1.0		3						(ALLUVIAL) GRY./BRN. SOFT TO STIFF WET SANDY CLAY W/GRAVEL
	19.60	2	3	3	1.0		6						
660.00													
	24.60	2	7	6	1.0		13						(ALLUVIAL) GRAY/BRN. MED. DENSE WET SILTY SAND WITH GRAVEL.
	29.60	100			0.2				100				WEATHERED ROCK
650.00													
	34.40	100			0.1				100				
644.20													
BORING TERMINATED AT ELEV. 644.20' ON HARD CRYSTALLINE ROCK (TRI-CONE BIT REFUSAL).													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33597.1.1		ID B-4255		COUNTY ROWAN		GEOLOGIST RW TODD						
SITE DESCRIPTION BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK												
BORING NO B1-A		NORTHING 0.00		EASTING 0.00		GND WATER 0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 18+02.000		OFFSET 18.00ft LT		24 HR 7.00ft						
COLLAR ELEV 670.10ft		TOTAL DEPTH 49.60ft		START DATE 4/22/05		COMPLETION DATE 04/22/05						
DRILL MACHINE CME-550		DRILL METHOD NWCAS/NXWL		HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH		DEPTH TO ROCK 26.10ft		Log B1-A, Page 1 of 2								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
670.10												Ground Surface
660.00	10.20	1	0	0	1.0	0						(ALLUVIAL) GRAY&BRN. V. LOOSE TO LOOSE SAT. SILTY SAND.
	15.20	3	3	3	1.0	6						
650.00	20.20	18	20	18	1.0	38				SS-11		(RESIDUAL) TAN/WHITE DENSE SAT. SILTY COARSE SAND
	25.20	16	100		0.9	100				RUN 1		WEATHERED ROCK
640.00										RUN 2		(26.10-30.00, CRYSTALLINE ROCK) GRAY/BRN. MOD. SEV. WEATH. MED. HARD GABBRO. REC = 77% RQD = 31%
										RS-3		(30.00-34.90) GRAY/WHITE MOD. WEATH. MED. TO MOD. HARD GABBRO. REC = 96% RQD = 57%
										RUN 3		(34.90-39.80) GRAY/WHITE MOD. WEATH. MED. TO MOD. HARD GABBRO. REC = 100% RQD = 63%
630.00										RUN 4		(39.80-44.70) GRAY/WHITE MOD. WEATH. MED. TO MOD. HARD GABBRO. REC = 100% RQD = 53%
										RUN 5		(44.70-49.60) GRAY/WHITE MOD. WEATH. MED. TO MOD. HARD GABBRO. REC = 67% RQD = 47%
620.50												Continued on the next page

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33597.1.1		ID B-4255		COUNTY ROWAN		GEOLOGIST RW TODD						
SITE DESCRIPTION BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK												
BORING NO B1-A		NORTHING 0.00		EASTING 0.00		GND WATER 0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 18+02.000		OFFSET 18.00ft LT		24 HR 7.00ft						
COLLAR ELEV 670.10ft		TOTAL DEPTH 49.60ft		START DATE 4/22/05		COMPLETION DATE 04/22/05						
DRILL MACHINE CME-550		DRILL METHOD NWCAS/NXWL		HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH		DEPTH TO ROCK 26.10ft		Log B1-A, Page 2 of 2								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
620.50												BORING TERMINATED AT ELEV. 620.50 IN GRAY/WHITE MOD. WEATH. MED. TO MOD. HARD GABBRO.

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL UNIT CORE BORING REPORT**

<b>PROJECT NO:</b> 33597.1.1	<b>PROJECT ID:</b> B-4255	<b>COUNTY:</b> ROWAN	<b>GEOLOGIST:</b> R.W. TODD
<b>SITE DESCRIPTION:</b> BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK.	<b>BORING LOCATION (STA):</b> 18+02 -L-		<b>DRILLER:</b>
<b>BORING NO:</b> B1-A	<b>PERSONNEL:</b>		<b>OFFSET:</b> 18.0' LT.
<b>COLLAR ELEV:</b> 670.10'	<b>DRILL MACHINE:</b> CME-550		<b>CORE SIZE:</b> NXWL
<b>TOTAL DEPTH:</b> 49.60'	<b>DRILL EQUIP:</b>		<b>DATE STARTED:</b> 04/22/05
<b>TOTAL RUN:</b> 23.50'			<b>DATE COMPLETED:</b> 04/22/05

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
644.00	26.10		1	77	31		GRAY/BRN., MOD. SEV. WEATH., MED. HARD, GABBRO.  FS = VERY CLOSE TO CLOSE
640.10	30.00		2	96	57	RS-3	GRAY/BRN., MOD. WEATH., MED. TO MOD. HARD, GABBRO.  FS = CLOSE
635.20	34.90		3	100	63		GRAY/BRN., MOD. WEATH., MED. TO MOD. HARD, GABBRO.  FS = CLOSE
630.30	39.80		4	100	53		GRAY/BRN., MOD. WEATH., MED. TO MOD. HARD, GABBRO.  FS = CLOSE
625.40	44.70		5	67	47		GRAY/BRN., MOD. WEATH., MED. TO MOD. HARD, GABBRO.
620.50	49.60						FS = VERY CLOSE TO CLOSE
<b>NOTES</b>		HEALED AND UNHEALED 70+ DEGREE FRACTURES THROUGHOUT CORE.					

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO: 33597.1.1 PROJECT ID: B-4255 COUNTY: ROWAN GEOLOGIST: R.W. TODD  
 SITE DESCRIPTION: BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK. DRILLER:  
 BORING NO: B1-B BORING LOCATION (STA): 18+10 -L- OFFSET: 18.0' RT.  
 COLLAR ELEV: 668.60' PERSONNEL: CORE SIZE: NXWL  
 TOTAL DEPTH: 44.80' DRILL MACHINE: CME-550 DATE STARTED: 04/25/05  
 TOTAL RUN: 23.70' DRILL EQUIP: DATE COMPLETED: 04/25/05

PROJECT NO 33597.1.1		ID B-4255		COUNTY ROWAN		GEOLOGIST RW TODD						
SITE DESCRIPTION BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK							GND WATER					
BORING NO B1-B		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 18+10.000		OFFSET 18.00ft RT		24 HR 7.00ft						
COLLAR ELEV 668.60ft		TOTAL DEPTH 44.80ft		START DATE 4/25/05		COMPLETION DATE 04/25/05						
DRILL MACHINE CME-550			DRILL METHOD NWCAS/NXWL			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK 21.10ft			Log B1-B, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
668.60												Ground Surface
660.00	10.50	1	1	1	1.0	2						(ALLUVIAL) GRAY V. LOOSE WET SILTY SAND
650.00	15.50	14	28	52	1.0			80				(RESIDUAL) OLIVE/WHITE HARD MOIST TO WET SANDY SILT
640.00	20.50	100			0.4			100				WEATHERED ROCK
												(21.10-25.20, CRYSTALLINE ROCK) GRAY MOD. SEV. WEATH. MED. HARD GABBRO. REC = 80% RQD = 10%
												(25.20-30.20) GRAY MOD. SEV. TO MOD. WEATH. MOD. HARD GABBRO. REC = 88% RQD = 26%
												(30.20-35.00) GRAY MOD. WEATH. MOD. HARD GABBRO. REC = 98% RQD = 56%
												(35.00-39.90) GRAY SLI. WEATH. HARD GABBRO. REC = 96% RQD = 81%
												(39.90-44.80) GRAY SLI. WEATH. HARD GABBRO. REC = 94% RQD = 70%
623.80												BORING TERMINATED AT ELEV. 623.80' IN GRAY, SLI. WEATH., HARD GABBRO.

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
647.50	21.10		1	80	10		GRAY/BRN., MOD. SEV. WEATH., MED. HARD, GABBRO.  FS = CLOSE
643.40	25.20		2	88	26		GRAY/BRN., MOD. SEV. TO MOD. WEATH., MOD. HARD, GABBRO.  FS = CLOSE
638.40	30.20		3	98	56	RS-2	GRAY, MOD. WEATH., MOD. HARD, GABBRO.  FS = CLOSE TO MOD. CLOSE
633.60	35.00		4	96	81		GRAY., SLI. WEATH., HARD, GABBRO.  FS = CLOSE TO MOD. CLOSE
628.70	39.90		5	94	70		GRAY., SLI. WEATH., HARD, GABBRO.
623.80	44.80						FS = CLOSE
<b>NOTES</b> HEALED AND UNHEALED 60+ DEGREE FRACTURES THROUGHOUT CORE.							



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO: 33597.1.1      PROJECT ID: B-4255      COUNTY: ROWAN      GEOLOGIST: R.W. TODD  
 SITE DESCRIPTION: BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK.      DRILLER:  
 BORING NO: B2-B      BORING LOCATION (STA): 18+86 -L-      CORE SIZE: NXWL  
 COLLAR ELEV: 668.90'      PERSONNEL:      DATE STARTED: 04/21/05  
 TOTAL DEPTH: 44.90'      DRILL MACHINE: CME-550      DATE COMPLETED: 04/21/05  
 TOTAL RUN: 27.90'      DRILL EQUIP:

PROJECT NO 33597.1.1		ID B-4255		COUNTY ROWAN		GEOLOGIST RW TODD								
SITE DESCRIPTION BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK						GND WATER								
BORING NO B2-B		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 18+86.000		OFFSET 18.00ft RT		24 HR 7.00ft								
COLLAR ELEV 668.90ft		TOTAL DEPTH 44.90ft		START DATE 4/21/05		COMPLETION DATE 04/21/05								
DRILL MACHINE CME-550			DRILL METHOD NWCAS/NXWL			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK 17.00ft			Log B2-B, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
668.90														Ground Surface
														RIP-RAP BOULDERS
660.00	10.70	1	2	2	1.0	4								(ALLUVIAL) GRAY VERY LOOSE TO LOOSE SILTY COARSE SAND.
	15.70	18	23	77	0.8									(RESIDUAL) BRN. VERY STIFF TO HARD COARSE SANDY SILT.
650.00														(17.00-20.50) CRYSTALLINE ROCK) GRAY/BRN. MOD. SEV. WEATH. MED. HARD GABBRO. REC = 77% RQD = 20%
														(20.50-25.50) GRAY/BRN. MOD. SEV. WEATH. MED. HARD GABBRO. REC = 100% RQD = 14%
640.00														(25.50-30.40) GRAY/BRN. MOD. SEV. WEATH. MED. HARD GABBRO. REC = 100% RQD = 51%
														(30.40-35.50) GRAY/BRN. MOD SEV. TO MOD. WEATH. MOD. HARD GABBRO. REC = 84% RQD = 29%
630.00														(35.50-40.50) GRAY SLI. WEATH. HARD GABBRO. REC = 88% RQD = 88%
624.00														(40.50-44.90) GRAY SLI. WEATH. HARD GABBRO. REC = 100% RQD = 100%
														BORING TERMINATED AT ELEV. 624.00' IN GRAY SLI WEATH. HARD, GABBRO.

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
651.90	17.00		1	77	20		GRAY/BRN., MOD. SEV. WEATH., MED. HARD, GABBRO.  FS = VERY CLOSE TO CLOSE
648.40	20.50		2	100	14		GRAY/BRN., MOD. SEV. WEATH., MED. HARD, GABBRO.  FS = VERY CLOSE TO CLOSE
643.40	25.50		3	100	51		GRAY/BRN., MOD. SEV. WEATH., MED. HARD, GABBRO.  FS = VERY CLOSE TO CLOSE
638.50	30.40		4	84	29		GRAY/BRN., MOD. SEV. TO MOD. WEATH., MOD. HARD, GABBRO.  FS = CLOSE
633.40	35.50		5	88	88		GRAY., SLI. WEATH., HARD, GABBRO.  FS = MOD. CLOSE TO WIDE
628.40	40.50		6	100	100		GRAY., SLI. WEATH., HARD, GABBRO.  FS = MOD. CLOSE TO WIDE
624.00	44.90						
<b>NOTES</b>		70 + DEGREE FRACTURES THROUGHOUT RUNS 1 - 4.					





SOIL AND ROCK TEST RESULTS

PROJECT: 33597.1.1 (B-4255)

COUNTY: ROWAN

SITE DESCRIPTION: BRIDGE No. 028 ON NC 801 OVER WITHROW CREEK

SOIL SAMPLE DATA

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	N	LL	P.I.	% BY WEIGHT				% PASSING SIEVES		
								C. SAND	F. SAND	SILT	CLAY	10	40	200
<b>EB1-A</b>														
SS-18	6.00' LT.	17+50 -L-	4.60'-6.10'	A-6(1)	10	37	12	27.6	31.4	20.8	20.3	83	67	40
SS-19	6.00' LT.	17+50 -L-	19.60'-21.10'	A-6(5)	3	34	14	7.8	43.1	18.7	30.4	100	96	57
<b>B1-A</b>														
SS-11	18.00' LT.	18+02 -L-	20.10'-21.70'	A-2-4(0)		27	NP	39.7	34.4	19.9	6.0	97	73	31
<b>B2-B</b>														
SS-15	18.00' RT.	18+86 -L-	15.70'-17.00'	A-4(0)	100	23	NP	26.3	43.8	21.8	8.0	98	86	38
<b>EB2-A</b>														
SS-16	6.00' LT.	19+15 -L-	4.40'-5.90'	A-6(4)	6	31	15	20.3	37.4	17.0	25.3	95	85	48
SS-17	6.00' LT.	19+15 -L-	24.40'-25.90'	A-2-4(0)	28	22	NP	33.2	50.5	12.3	4.1	97	83	23
SS-20	6.00' LT.	19+15 -L-	29.40'-30.00'	A-2-4(0)	100	25	NP	21.5	54.5	16.9	7.1	90	82	31
SS-21		CREEK BOTTOM		A-2-4(0)		33	NP	10.1	75.2	8.6	6.1	100	99	23
SS-22		CHANNEL BANKS		A-2-4(0)		31	NP	8.2	81	5.8	5.1	100	99	17

ROCK SAMPLE DATA

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	RQD %	UNIT WT	Q(MPa) (MPsi)	E(Mpa) (MPsi)
<b>B1-A</b>							
RS-3	18.00' LT.	18+02 -L-	32.75'-33.35'	57%			CURRENTLY BEING TESTED
<b>B1-B</b>							
RS-2	18.00' RT.	18+10 -L-	32.65'-33.30'	56%			CURRENTLY BEING TESTED
<b>B2-A</b>							
RS-1	7.20' LT.	18+77.50 -L-	22.75'-23.25'	87%			CURRENTLY BEING TESTED

**GEOTECHNICAL UNIT FIELD SCOUR REPORT**

PROJECT: 33597.1.1 TIP NO.: B-4255 COUNTY: ROWAN

DESCRIPTION(1): BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK.

◆ **INFORMATION ON EXISTING BRIDGES** Information obtained from  Field Inspection  
 Microfilm (Reel:            Position:            )  
 Other

COUNTY BRIDGE NO. 028 BRIDGE LENGTH APP. 150' NO. BENTS 5 NO. BENTS IN: CHANNEL 1 FLOODPLAIN 5

FOUNDATION TYPE: *TIMBER PILES*

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: *EVIDENCE OF SEVERE EROSION IN PAST BETWEEN BENT TWO AND END BENT TWO.*INTERIOR BENTS: *SEVERE EROSION AT BENT TWO. SIX TIMBER PILES ARE EXPOSED BELOW CONCRETE PROTECTION.*CHANNEL BED: *NONE*CHANNEL BANKS: *MODERATE EROSION ON BOTH CHANNEL BANKS.*◆ **EXISTING SCOUR PROTECTION:**TYPE(3): *RIP-RAP*EXTENT(4): *RIP-RAP PLACED FROM EB2 ABUTMENT PROTECTION TO INTERIOR BENT TWO. SIZE VARIES FROM 1' DIA. TO 3X3 BOULDERS.*EFFECTIVENESS(5): *MODERATE.*OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): *MINIMAL DEBRIS THROUGH BRIDGE AREA.*◆ **DESIGN INFORMATION**CHANNEL BED MATERIAL(7) (Sample Results Attached): *AS SS-21. LOOSE, WET, SILTY FINE SAND (A-2-4).*CHANNEL BANK MATERIAL(8) (Sample Results Attached): *AS SS-22. VERY LOOSE TO LOOSE, WET TO SAT. SILTY FINE SAND (A-2-4).*CHANNEL BANK COVER(9): *GRASS, TREES, AND RIP-RAP AT WATER LINE CROSSING.*FLOOD PLAIN WIDTH(10): *APP. 500'*FLOOD PLAIN COVER(11): *TREES, CROPS, PASTURE LAND.*STREAM IS:  DEGRADING  AGGRADING (12)OTHER OBSERVATIONS AND COMMENTS: *EB2 ABUTMENT SLOPE PROTECTION IN VERY BAD SHAPE DUE TO EROSION CAUSED BY**WATER LINE CONSTRUCTION.*

◆  
 ◆  
 ◆  
 ◆ **DESIGN INFORMATION CONT.**

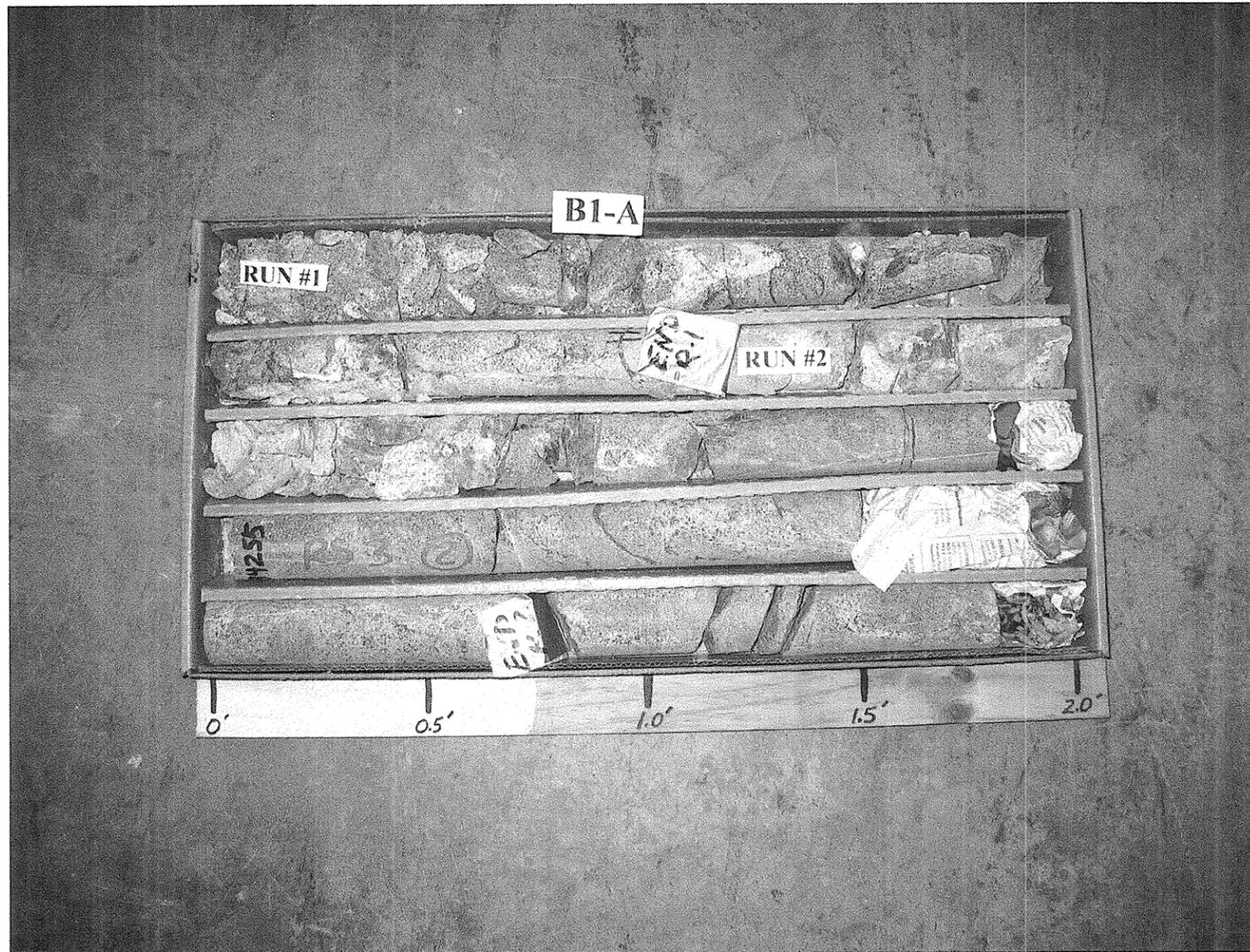
CHANNEL MIGRATION TENDENCY(13): *MODERATE TENDENCY FOR MIGRATION TOWARD END BENT TWO.*

GEOTECHNICAL ADJUSTED SCOUR ELEVATIONS (14): *NO SCOUR ANTICIPATED ON END BENTS ASSUMING ADEQUATE RIP-RAP IS USED. OUR GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS ARE AS FOLLOWS:*

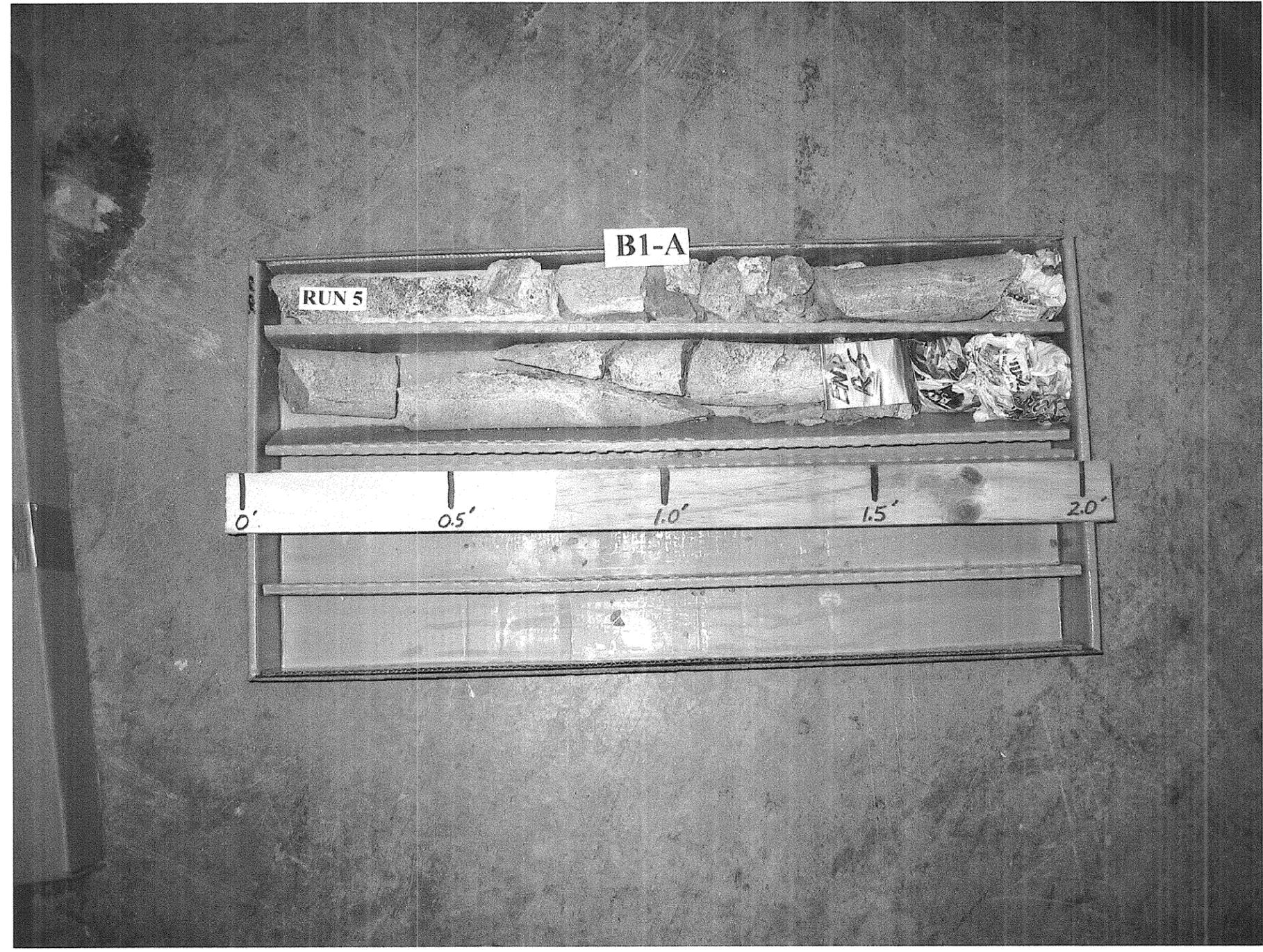
*BENT ONE - 650.50' (100 YR.), 644.50' (500 YR.). BENT TWO - 650.50' (100 YR.), 644.50' (500 YR.).**THESE ELEVATIONS MATCH THE PREDICTIONS MADE BY THE HYDRAULICS UNIT.*REPORTED BY: *JP ROGERS/RW TODD* DATE: *06/27/05***INSTRUCTIONS**

- (1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
- (2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS DEGRADATIONS, ETC.)
- (3) NOTE ANY EXISTING SCOUR PROTECTION (RIPRAP, ETC.)
- (4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
- (5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
- (6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
- (7) DESCRIBE THE CHANNEL BED MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (8) DESCRIBE THE CHANNEL BANK MATERIAL; A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
- (9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIPRAP, NONE, ETC.)
- (10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (14) GIVE THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICAL ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENT RQD; DIFFERENTIAL WEATHERING; SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

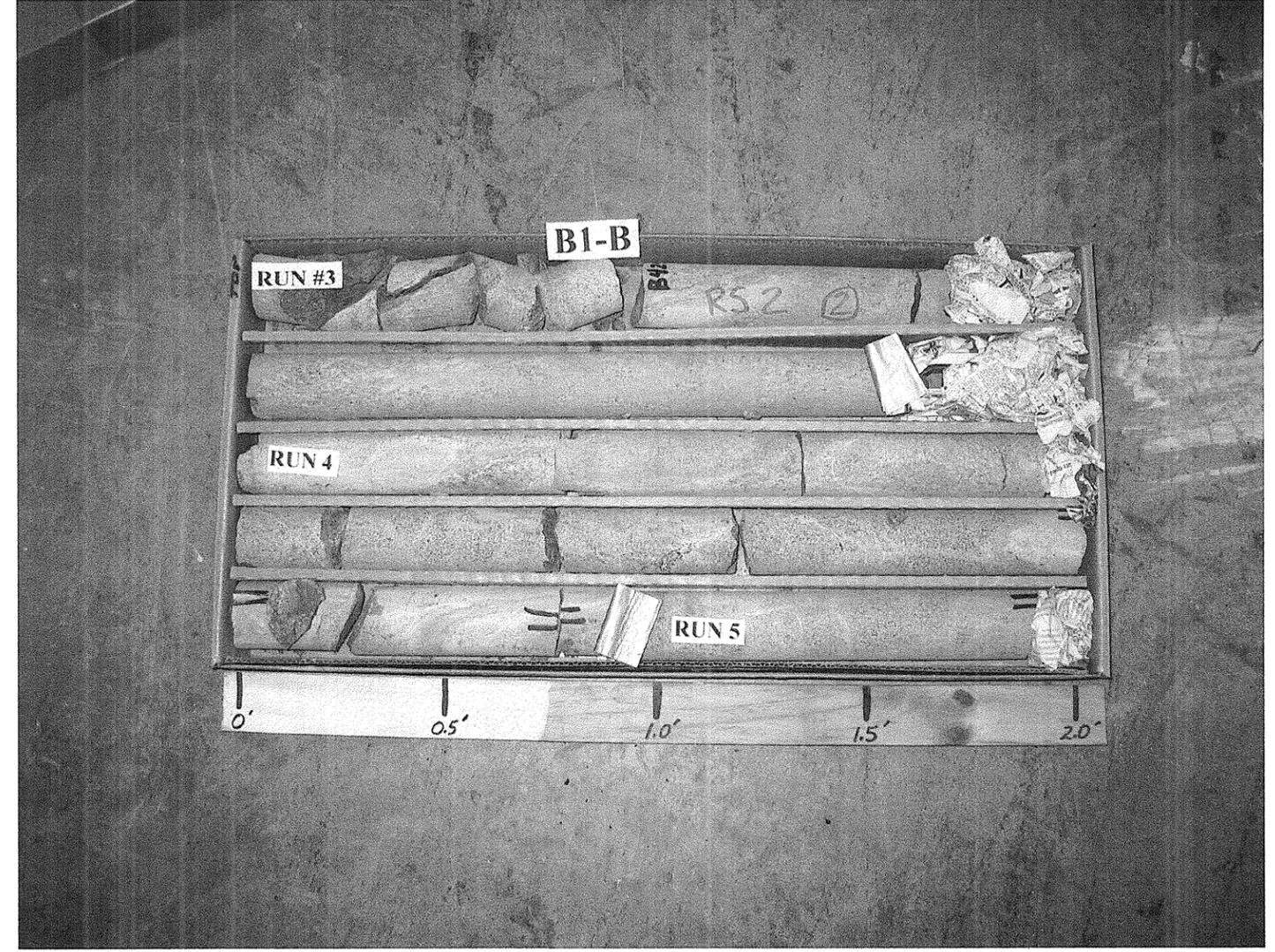
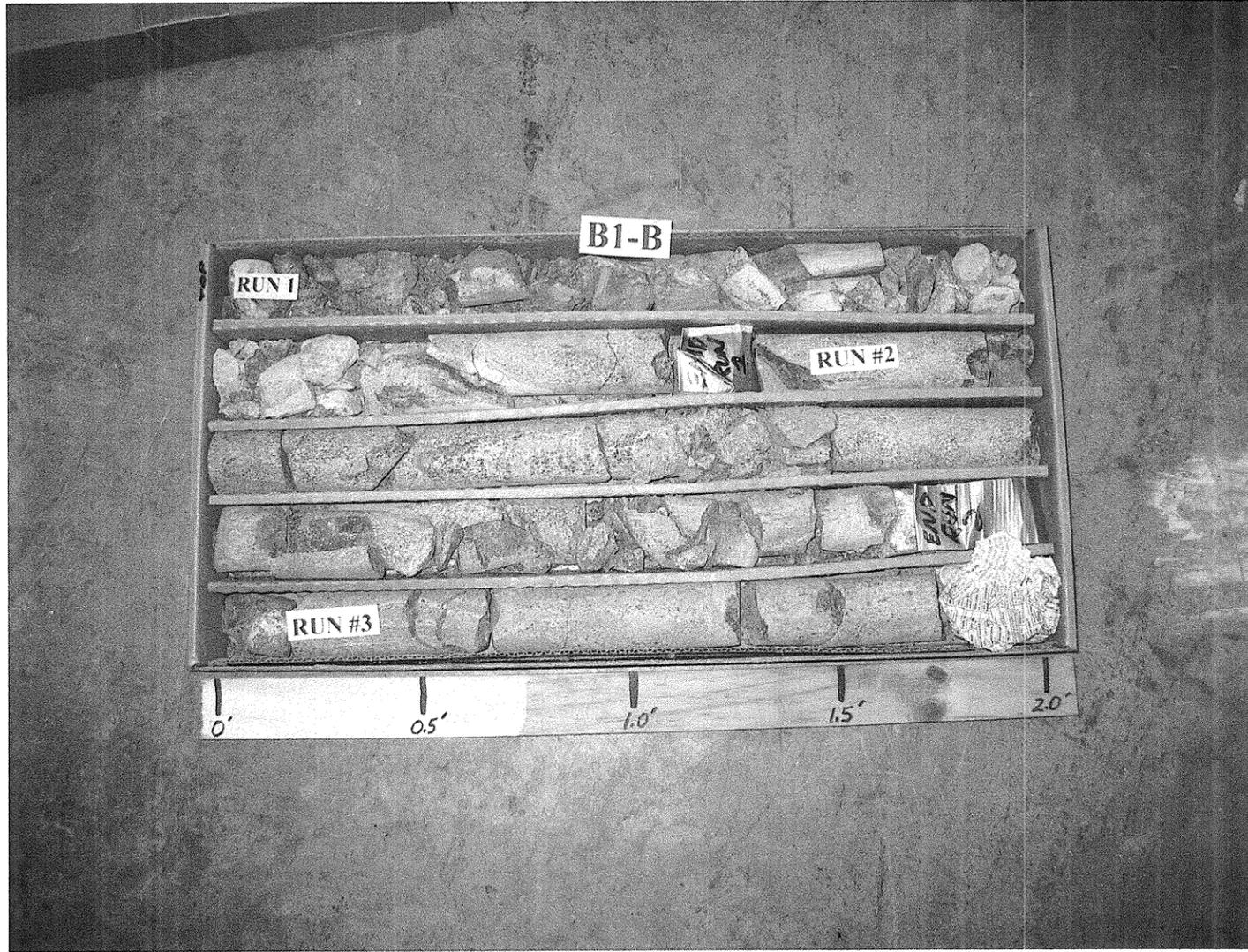
33597.1.1 (B-4255)  
ROWAN  
BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK



33597.1.1 (B-4255)  
ROWAN  
BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK



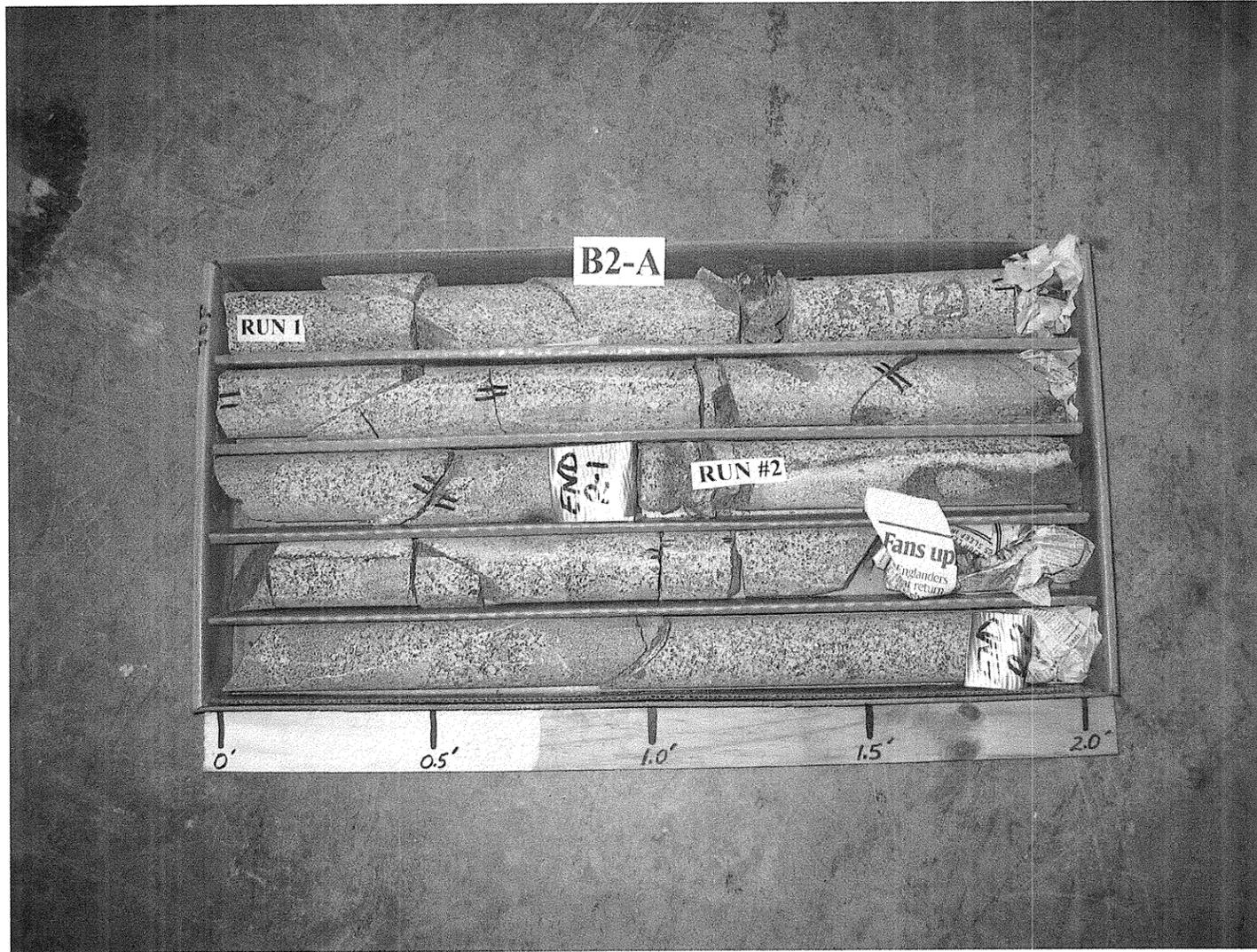
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ROWAN  
BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK



33597.1.1 (B-4255)  
ROWAN  
BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK



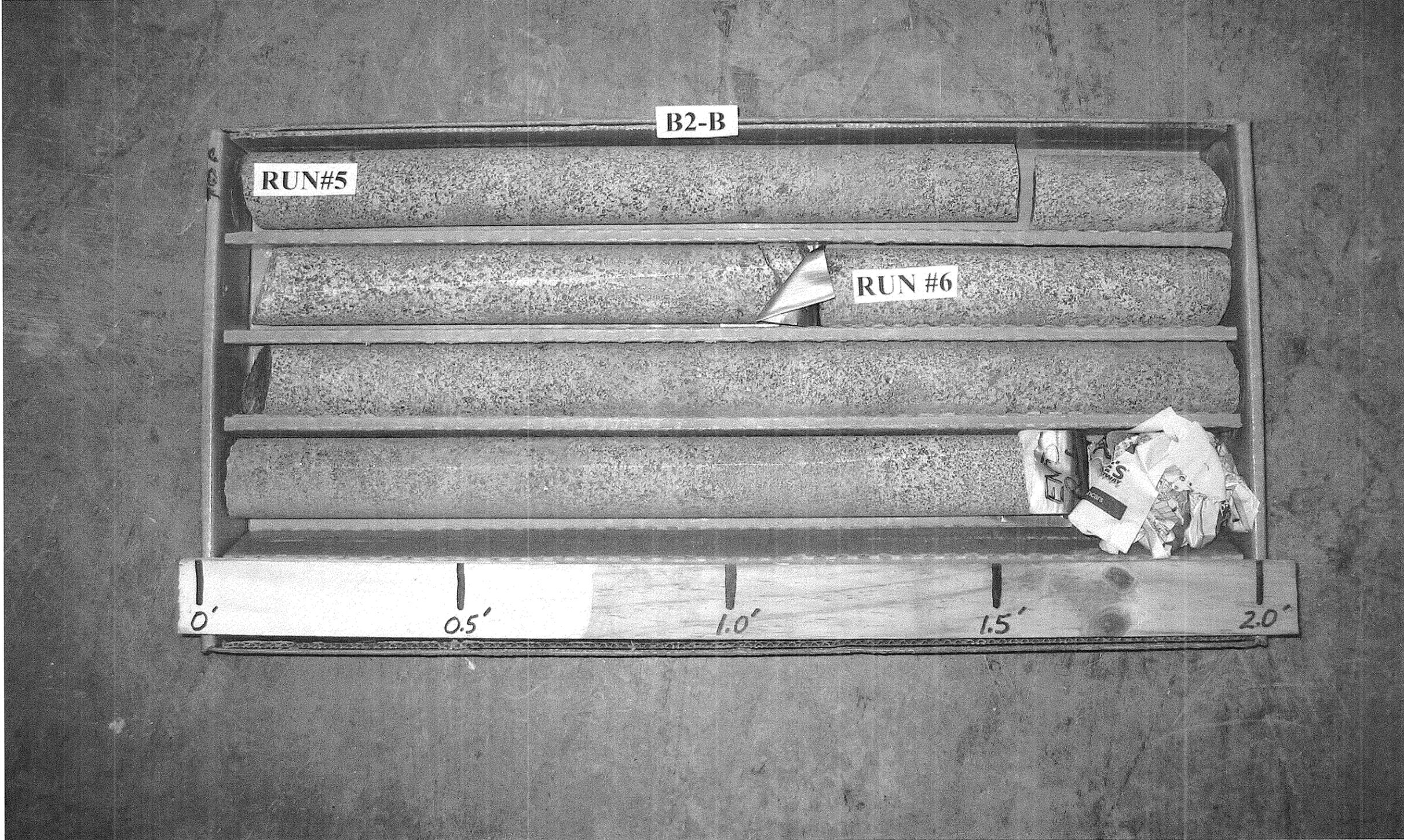
33597.1.1 (B-4255)  
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BRIDGE NO. 28 ON NC 801 OVER WITHROW CREEK



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