

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33748.1.1 (B-4524)	1	11

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 33748.1.1 (B-4524) F.A. PROJ. BRZ-1309(5)  
COUNTY GRANVILLE  
PROJECT DESCRIPTION BRIDGE NO. 193 ON -L- (SR 1309)  
OVER SHELTON CREEK AT STATION 14+31

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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.

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-PLACED) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

**PROJECT: 33748.1.1**  
**ID: B-4524**

PERSONNEL

J. L. PEDRO

H. R. CONLEY

D. W. DIXON

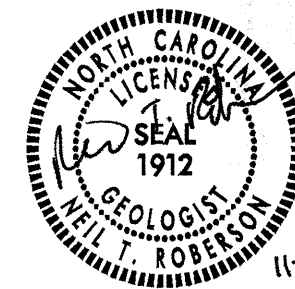
M. L. REEDER

INVESTIGATED BY J. L. PEDRO

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE NOVEMBER 2006



DRAWN BY: J. L. PEDRO

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. 33748.I.I(B-4524)	SHEET NO. 2
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**SUBSURFACE INVESTIGATION**

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

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																									
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, DARK, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 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:		<b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - A FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLED IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (ROD)</b> - 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. <b>SAPROLITE (SAP)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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 INTRODUCED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN 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 60 BLOWS. <b>STRATA CORE RECOVERY (SREC)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="2">GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th colspan="2">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING</th> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> <td>10 40 200</td> </tr> <tr> <th>LIQUID LIMIT PLASTIC INDEX</th> <td>6 MX</td> <td>NP</td> <td>40 MX 10 MX 10 MN 11 MN</td> <td>40 MX 10 MX 10 MN 11 MN</td> <td>40 MX 10 MX 10 MN 11 MN</td> <td>40 MX 10 MX 10 MN 11 MN</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> </tr> <tr> <th>GENERATING AS A SUBGRADE</th> <td colspan="2">EXCELLENT TO GOOD</td> <td colspan="2">FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> </tr> </table>		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	SYMBOL							% PASSING	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	10 40 200	LIQUID LIMIT PLASTIC INDEX	6 MX	NP	40 MX 10 MX 10 MN 11 MN	40 MX 10 MX 10 MN 11 MN	40 MX 10 MX 10 MN 11 MN	40 MX 10 MX 10 MN 11 MN	GROUP INDEX	0	0	4 MX	8 MX	12 MX	16 MX	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS		GENERATING AS A SUBGRADE	EXCELLENT TO GOOD		FAIR TO POOR		POOR	UNSATURABLE	<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		<b>WEATHERED ROCK (WR)</b> 		<b>CRYSTALLINE ROCK (CR)</b> 	
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<b>GROUND WATER</b> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		<b>WEATHERING</b> FRESH ROCK GENERALLY FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ALSO AN EXAMPLE.		<b>MISCELLANEOUS SYMBOLS</b> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL SAMPLE DESIGNATIONS S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE																																																											
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STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

LYNDO TIPPETT  
SECRETARY

November 21, 2006

STATE PROJECT: 33748.1.1 (B-4524)  
F.A. PROJECT: BRZ-1309 (5)  
COUNTY: Granville  
DESCRIPTION: Bridge No. 193 on -L- (SR 1309) over Shelton Creek at Station 14+31  
SUBJECT: Geotechnical Report – Structure Inventory

**Project Description**

A single-span bridge, 100-feet in length with a 110° skew, is proposed on -L- (SR 1309) over Shelton Creek. The project is located in northwestern Granville County about 2 miles south of Goshen.

The subsurface investigation was conducted during October and November of 2006 using an ATV-mounted CME-550X drill machine. Standard Penetration Test borings were performed at each of the proposed bent locations. All borings were advanced to crystalline rock using hollow stem augers. Representative soil samples were obtained for visual classification in the field and selected samples were sent to the Materials and Tests Unit for laboratory analysis.

**Physiography and Geology**

The project is located in the gently rolling terrain of the Piedmont Physiographic province. Geologically, the site is underlain by felsic and mafic metavolcanic rock from the Carolina Slate Belt. The area consists of a mixture of woods and pastures with scattered homes.

**Soil Properties**

Soils encountered at the project site include roadway embankment and alluvial soils.

Roadway embankment soils were encountered at both bent locations. The embankment soils range in thickness from 6.0 to 10.0 feet. These soils consist of red-orange and brown, soft to medium stiff, moist, silty clay (A-7-5 and A-7-6) and sandy clay (A-6). Alluvial soils underlie roadway embankment soils.

Alluvial soils range from 3.0 to 7.2 feet in thickness. These soils predominantly consist of gray to tan and brown, soft to very stiff, dry to wet, sandy silt (A-4) with trace to some weathered rock fragments. Other soils present consist of tan, gray, and brown, stiff, moist, silty clay (A-7-6) and sandy clay (A-6) with trace weathered rock fragments. The alluvial soils were deposited on weathered rock at both bent locations.

**Rock Properties**

Weathered rock was derived from the underlying felsic and mafic metavolcanic rock, and ranges in thickness from 1.7 to 3.1 feet. Weathered rock was encountered in all of the borings. The top of weathered rock ranges in elevation from 489.1 feet at EB1-B to 493.3 feet at EB2-B.

Crystalline rock was encountered at all bent locations and is present upstream in Shelton Creek. Rock present at the site predominantly consists of greenish-gray, severely weathered to fresh, hard, thickly bedded, metavolcanic rock. The top of crystalline rock ranges in elevation from 486.0 feet at EB1-B to 491.6 feet at EB2-B.

**Groundwater**

Groundwater was encountered at End Bent 1. The groundwater elevation ranges from 491.1 feet to 491.3 feet at the End Bent 1 location. The water in Shelton Creek was at an elevation of 490.1 feet (5-06).

**Notice**

This Geotechnical foundation report is based on the Preliminary General Drawing dated August, 2006 and the Hydraulics Bridge Report dated August 1, 2006. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

Prepared by,

*Jaime Love Pedro*

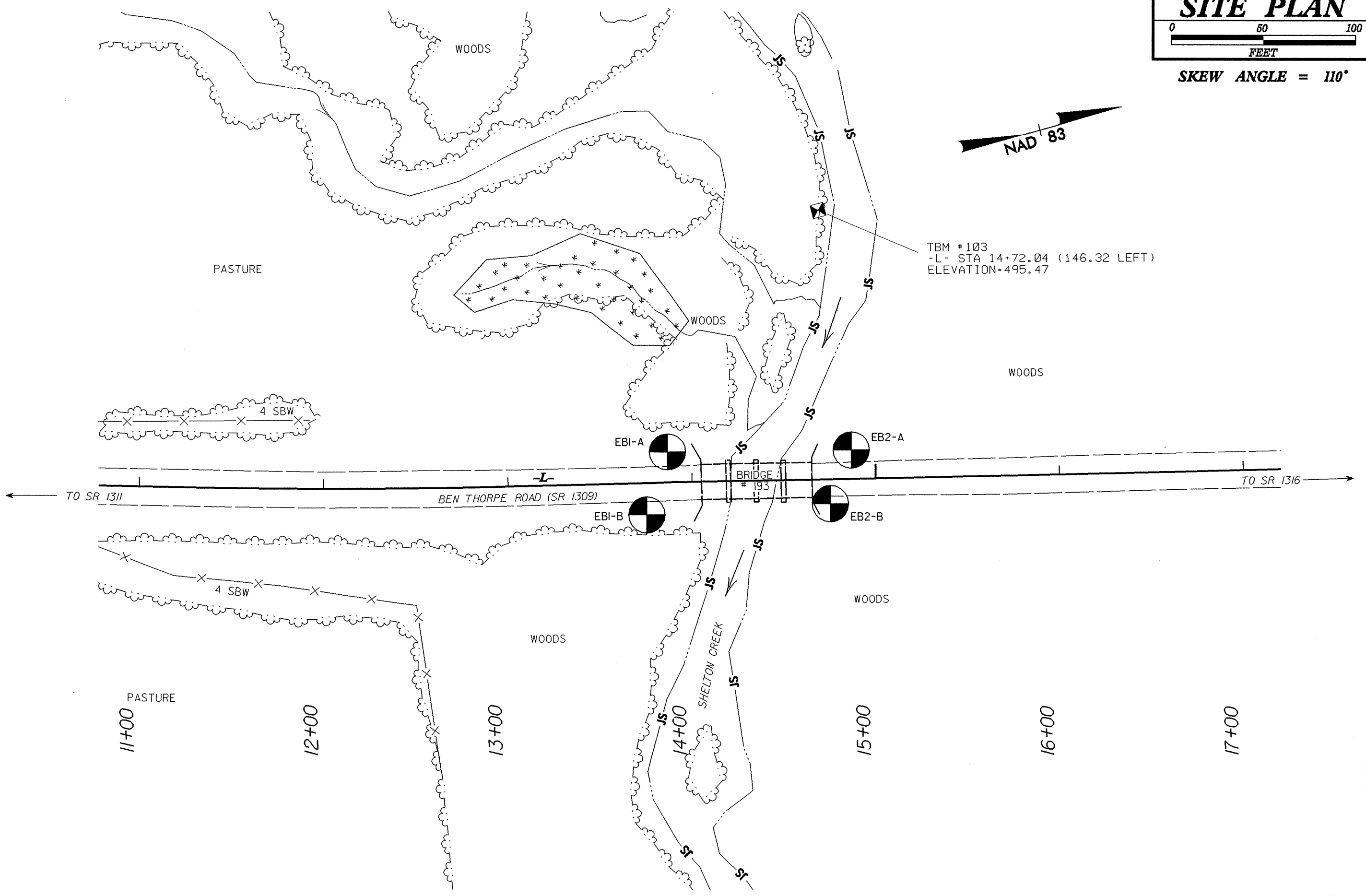
Jaime Love Pedro  
Engineering Geologist

PROJECT REFERENCE NO.	SHEET
33748.1.1 (B-4524)	4
<b>SITE PLAN</b>	

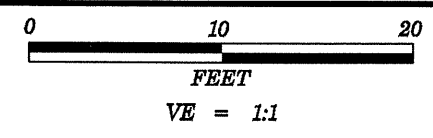
SKEW ANGLE = 110°



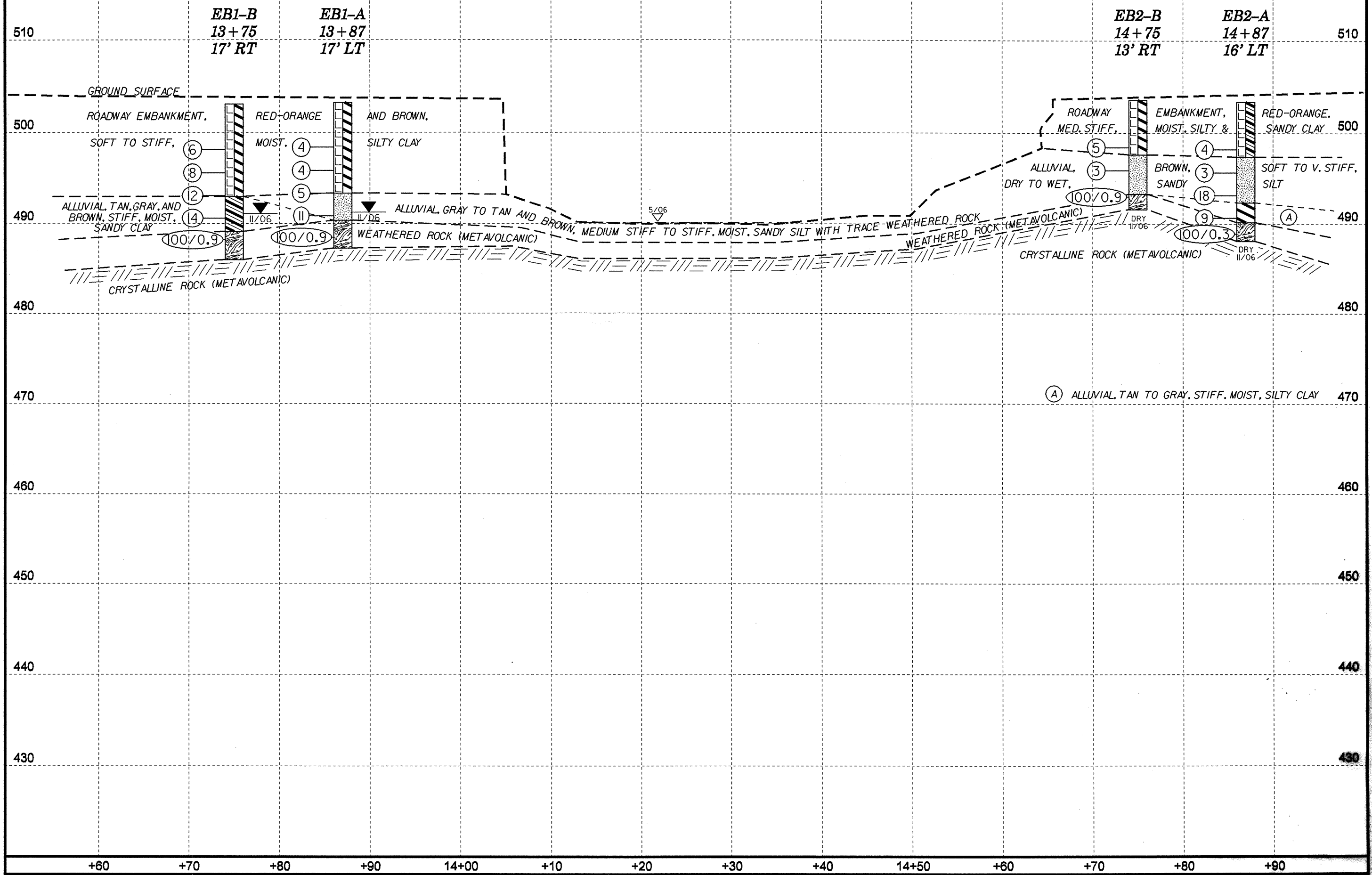
TBM #103  
 -L- STA 14+72.04 (146.32 LEFT)  
 ELEVATION=495.47



# PROFILE THROUGH BORINGS PROJECTED ALONG -L-



PROJECT REFERENCE NO.	SHEET
33748.1.1 (B-4524)	5







PROJECT NO. 33748.1.1		ID. B-4524		COUNTY Granville		GEOLOGIST Pedro, J. L.								
SITE DESCRIPTION Bridge No. 193 on -L- (SR 1309) over Shelton Creek							GROUND WTR (ft)							
BORING NO. EB2-A		STATION 14+87		OFFSET 16 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 503.4 ft		TOTAL DEPTH 15.3 ft		NORTHING 960,104		EASTING 2,072,603								
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
START DATE 11/01/06		COMP. DATE 11/01/06		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 15.3 ft								
ELEV. (ft)	ELEV. DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
505													503.4	0.0
500	499.2												497.4	6.0
	4.2	2	2	2						SS-9	M			
	496.7													
	6.7	3	2	1						SS-10	D			
495	494.2												492.4	11.0
	9.2	5	5	13							D			
	491.7													
	11.7	2	3	6						SS-11	M		490.2	13.2
490	489.2												488.1	15.3
	14.2	100/0.3							100/0.3					
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460														
455														
450														
445														
440														
435														
430														

PROJECT NO. 33748.1.1		ID. B-4524		COUNTY Granville		GEOLOGIST Pedro, J. L.								
SITE DESCRIPTION Bridge No. 193 on -L- (SR 1309) over Shelton Creek							GROUND WTR (ft)							
BORING NO. EB2-B		STATION 14+75		OFFSET 13 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 503.6 ft		TOTAL DEPTH 12.0 ft		NORTHING 960,085		EASTING 2,072,628								
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
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455														
450														
445														
440														
435														
430														

NCDOT BORE DOUBLE B4524\_GEO\_BH.GPJ\_NC\_DOT.GDT 11/22/06



**PROJ. NO. - 33748.1.1**  
**ID NO. - B-4524**  
**COUNTY - Granville**

**EB1-A**

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	17' LT	13+87	9.9-10.4	A-4(2)	29	6	15.1	20.9	37.8	26.2	93	85	63	-	-
SS-6	17' LT	13+87	11.4-12.9	A-4(3)	27	8	12.3	22.7	32.8	32.2	90	84	63	-	-

**EB1-B**

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	17' RT	13+75	4.0-5.5	A-7-6(19)	49	24	8.0	7.2	30.4	54.3	89	84	77	-	-
SS-2	17' RT	13+75	6.5-8.0	A-7-5(18)	54	15	5.2	5.6	30.8	58.4	98	94	89	-	-
SS-3	17' RT	13+75	10.1-10.5	A-6(7)	32	12	8.5	21.7	37.6	32.2	94	90	70	-	-
SS-4	17' RT	13+75	11.5-13.0	A-6(6)	37	16	11.9	22.5	33.4	32.2	77	72	55	-	-

**EB2-A**

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-9	16' LT	14+87	4.2-5.7	A-6(8)	35	12	11.1	7.6	27.0	54.3	89	81	74	-	-
SS-10	16' LT	14+87	6.7-8.2	A-4(3)	33	9	16.5	11.1	40.2	32.2	76	66	57	-	-
SS-11	16' LT	14+87	11.7-13.2	A-7-6(18)	42	19	3.0	10.1	36.6	50.3	100	99	90	-	-

**EB2-B**

<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	13' RT	14+75	4.2-5.7	A-7-6(13)	43	20	14.5	8.7	28.6	48.3	90	79	71	-	-
SS-8	13' RT	14+75	6.7-8.2	A-4(0)	31	6	29.0	9.9	35.0	26.2	66	50	42	-	-



**FIELD  
SCOUR REPORT**

WBS: 33748.1.1 TIP: B-4524 COUNTY: Granville

DESCRIPTION(1): Bridge No. 193 on -L- (SR 1309) over Shelton Creek

**EXISTING BRIDGE**

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

Bridge No.: 193 Length: 60' Total Bents: 5 Bents in Channel: 2 Bents in Floodplain: 3  
Foundation Type: Timber piles on spread footings

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: Bottom of footing exposed at End Bent 1

Interior Bents: None

Channel Bed: None

Channel Bank: Some minor scour along banks

**EXISTING SCOUR PROTECTION**

Type(3): Wood wing walls and concrete encasements

Extent(4): Walls-30' L x 8' H and Concrete-25' L x 3' H x 2' W

Effectiveness(5): Effective

Obstructions(6): None

**INSTRUCTIONS**

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodibility 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): Alluvial, gray to tan and brown, soft to stiff, sandy silt with trace weathered rock and cobbles (SS-6)

Channel Bank Material(8): Alluvial, brown, soft, sandy silt (SS-10)

Channel Bank Cover(9): Grass, trees, and brush

Floodplain Width(10): +/- 200 feet

Floodplain Cover(11): Grass, trees, and brush

Stream is(12): Aggrading \_\_\_\_\_ Degrading  Static \_\_\_\_\_

Channel Migration Tend.(13): South towards End Bent 1

Observations and Other Comments: None

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters \_\_\_\_\_

Comparison of DSE to Hydraulics Unit theoretical scour:  
The Design Scour Elevation is 486.0 feet, which is 6.0 feet higher than the theoretical scour (480.0 feet).

**SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL**

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

See Sheet 9,  
"Soil Test Results",  
for samples:  
SS-6  
SS-10

Reported by: Jaime Love Pedro  
Jaime Love Pedro

Date: 10/31/2006

# SITE PHOTOGRAPH

Bridge No. 193 on -L- (SR 1309) over Shelton Creek

