

CONTRACT: 34813.1.1 ID: U-2510A

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34813.1.1 (U-2510A)	1	21
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

CONTENTS:

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	REPORT
4	SITE PLAN
5-8	CROSS SECTIONS
9	PROFILE
10-17	BORE LOGS
18	SOIL TEST RESULTS
19-20	CORE PHOTOS
21	SCOUR REPORT

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STATE PROJECT 34813.1.1 I.D. NO. U-2510A

F.A. PROJECT _____

COUNTY MECKLENBURG / UNION

PROJECT DESCRIPTION NC 16
(OLD PROVIDENCE RD.)

SITE DESCRIPTION BRIDGE ON NC 16
OVER SIX MILE CREEK

INVESTIGATED BY J.E. BEVERLY PERSONNEL J.K. STICKNEY

CHECKED BY C.B. LITTLE C.L. SMITH

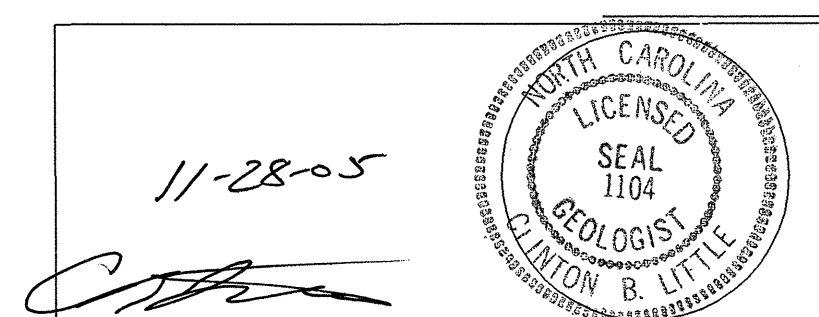
SUBMITTED BY C.B. LITTLE K. WISE

DATE NOVEMBER 2005

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.

DRAWN BY: J.E. BEVERLY







NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-2510A	34813.1.1	2	21

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 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: <i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH 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, WHICH 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 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. STRATA CORE RECOVERY (REC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. 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. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	WEATHERING	
GENERAL CLASS. GRANULAR MATERIALS (< 75% PASSING #200) SILT-CLAY MATERIALS (> 75% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH ROCK 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 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 B.P.F.</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 < 100 B.P.F.</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.	
COMPRESSION	PERCENTAGE OF MATERIAL	GROUND WATER	
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING. STATIC WATER LEVEL AFTER 24 HOURS. PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA SPRING OR SEEPAGE	
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	ROCK HARDNESS	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS INFERRED SOIL BOUNDARIES INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP/DIP DIRECTION OF ROCK STRUCTURES 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 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. 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	ABBREVIATIONS	EQUIPMENT USED ON SUBJECT PROJECT	
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 0.425 0.25 0.075 0.053	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE. - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F. - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED FRAGS. - FRAGMENTS MED. - MEDIUM PMT - PRESSUREMETER TEST SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - UNIT WEIGHT w - MOISTURE CONTENT V. - VERY VST - VANE SHEAR TEST	DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> OTHER <input type="checkbox"/> OTHER	
SOIL MOISTURE - CORRELATION OF TERMS	FRACTURE SPACING	HAMMER TYPE:	
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input checked="" type="checkbox"/> -N XWL <input type="checkbox"/> -H HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> OTHER	
LL - LIQUID LIMIT - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	BEDDING TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
PLASTICITY	INDURATION	FRACTURE SPACING	
NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH LOW PLASTICITY 0-5 VERY LOW MED. PLASTICITY 6-15 SLIGHT HIGH PLASTICITY 16-25 MEDIUM 26 OR MORE HIGH			
COLOR			
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.			

BENCH MARK: BL #52 AT STATION I43+85 19.7' RT
ELEVATION: 618.40'

NOTES:



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY P.O. BOX 25201, RALEIGH, N.C. 27611-5201 LYNDO TIPPETT
GOVERNOR SECRETARY

November 17, 2005

STATE PROJECT: 34813.1.1 (U-2510A)
COUNTY: Mecklenburg / Union
DESCRIPTION: Bridge on NC 16 over Six Mile Creek @ -L- Sta. 124+82.50

SUBJECT: Geotechnical Report – Bridge Foundation Investigation

This proposed bridge will be located along NC 16 over Six Mile Creek. The new structure location will be where the existing culvert structure is presently located. The proposed structure is a 3 span 21" cored slab design on a 70 degree skew. Span lengths are 30', 45', and 30'. Recommended width of roadway is 73.5 feet.

Two foundation test borings were performed at each bent location along the right lanes. A total of only 3 borings were performed along the left lanes of the proposed structure due to utility and access problems. Overhead power lines left of -L- necessitated the use of standard 6" solid augers in our 3 left lane test borings. These standard auger borings were performed mainly for the purpose of confirming rock elevation across the site. Equipment utilized during this investigation includes a CME 550X drill machine, NW Casing with NXWL, 6" solid augers, and an automatic drop hammer.

Physiography/Geology

The project area is located in southern Mecklenburg and northern Union counties. Six Mile Creek is the dividing line between these 2 counties. Area topography is flat to gently rolling with a wide floodplain associated with Six Mile Creek. The bridge site is partially wooded and NC 16 is a heavily traveled road. Geologically this site is part of the Charlotte Belt and is underlain by Paleozoic age gabbro rock.

Site specific soils noted during our investigation include existing roadway fill associated with NC 16, alluvial soils and residual soils. Alluvium consists of soft to medium stiff micaceous silty sandy clay (A-7-6, A-6) and very loose to medium dense silty clayey fine to coarse sand (A-2-4, A-1-b). Residual soils are comprised of very dense clayey silty sand (A-2-4).

Foundation Materials

End Bent 1:

This bent is located south of Six Mile Creek. Two borings performed for the right lanes and one for the left lanes encountered 13 to 19.6 feet of alluvial soft to medium stiff gray-brown micaceous silty sandy clay (A-7-5) overlying residual soil. Residual soil consists of 1 to 11 feet of very dense gray-white clayey silty sand (A-2-4). The residual soil contact begins at elevation 596' in the left lane boring and rises in elevation to 603.2 feet at boring EB1-A. Beneath residual soils lies a thin layer of weathered rock followed by hard rock. Weathered rock and hard rock contact elevations are as follows:

<u>Boring #</u>	<u>Weathered Rock Elevation (feet)</u>	<u>Hard Rock Elevation (feet)</u>
EB1-LT	592.89	592.59
EB1-A	601.73	601.13
EB1-B	589.55	588.05

Bent 1:

Bent 1 is located just south of Six Mile Creek. Two borings performed for the right lane and one for the left lane encountered 16 to 20.8 feet of alluvium overlying a very thin layer of residual soil and/or weathered rock followed by hard rock. Alluvium consists of soft brown-gray silty sandy clay (A-6), and very loose to loose gray silty clayey sand (A-2-4). Residual soil is 2 or fewer feet in thickness and consists of very dense gray clayey silty sand (A-2-4). The weathered rock layer is very thin between left and right lanes and non-existent in boring B1-B. Weathered rock and hard rock contact elevations are as follows:

<u>Boring #</u>	<u>Weathered Rock Elevation (feet)</u>	<u>Hard Rock Elevation (feet)</u>
B1-LT	599.43	598.53
B1-A	593.04	592.64
B1-B	N/A	594.59

Bent 2:

Bent 2 is located just north of Six Mile Creek. Two borings performed for the right lane and one for the left lane encountered 15 to 19 feet of alluvium overlying 1 to 3 feet of weathered rock followed by hard rock. Alluvium consists of loose to medium dense gray-brown silty clayey fine to coarse sand (A-2-4, A-1-b). Weathered rock and hard rock elevations are as follows:

<u>Boring #</u>	<u>Weathered Rock Elevation (feet)</u>	<u>Hard Rock Elevation (feet)</u>
B2-LT	594.70	591.00
B2-A	595.16	591.46
B2-B	597.92	596.72

End Bent 2:

Two borings were performed north of Six Mile Creek along the right lane for End Bent 2. The soil sequence is 10.7 to 11.4 feet of alluvium overlying 5.2 to 13.5 feet of residual material before weathered rock is encountered. Hard rock quickly follows weathered rock in boring EB2-B however hard rock was not encountered in boring EB2-A prior to boring termination. Alluvium consists of very loose gray-brown silty clayey sand (A-2-4) and soft to stiff gray clayey sandy silt (A-4). Residual soils are very dense brown-gray clayey silty sand (A-2-4) and occur at elevation 602.3 feet. Weathered rock and hard rock elevations are as follows:

<u>Boring #</u>	<u>Weathered Rock Elevation (feet)</u>	<u>Hard Rock Elevation (feet)</u>
EB2-A	588.81	N/A
EB2-B	597.10	596.50

Groundwater

Groundwater measurements taken more than 24 hours after each boring was performed indicate the static groundwater table lies between elevation 610 and 612 feet.

Respectfully submitted,

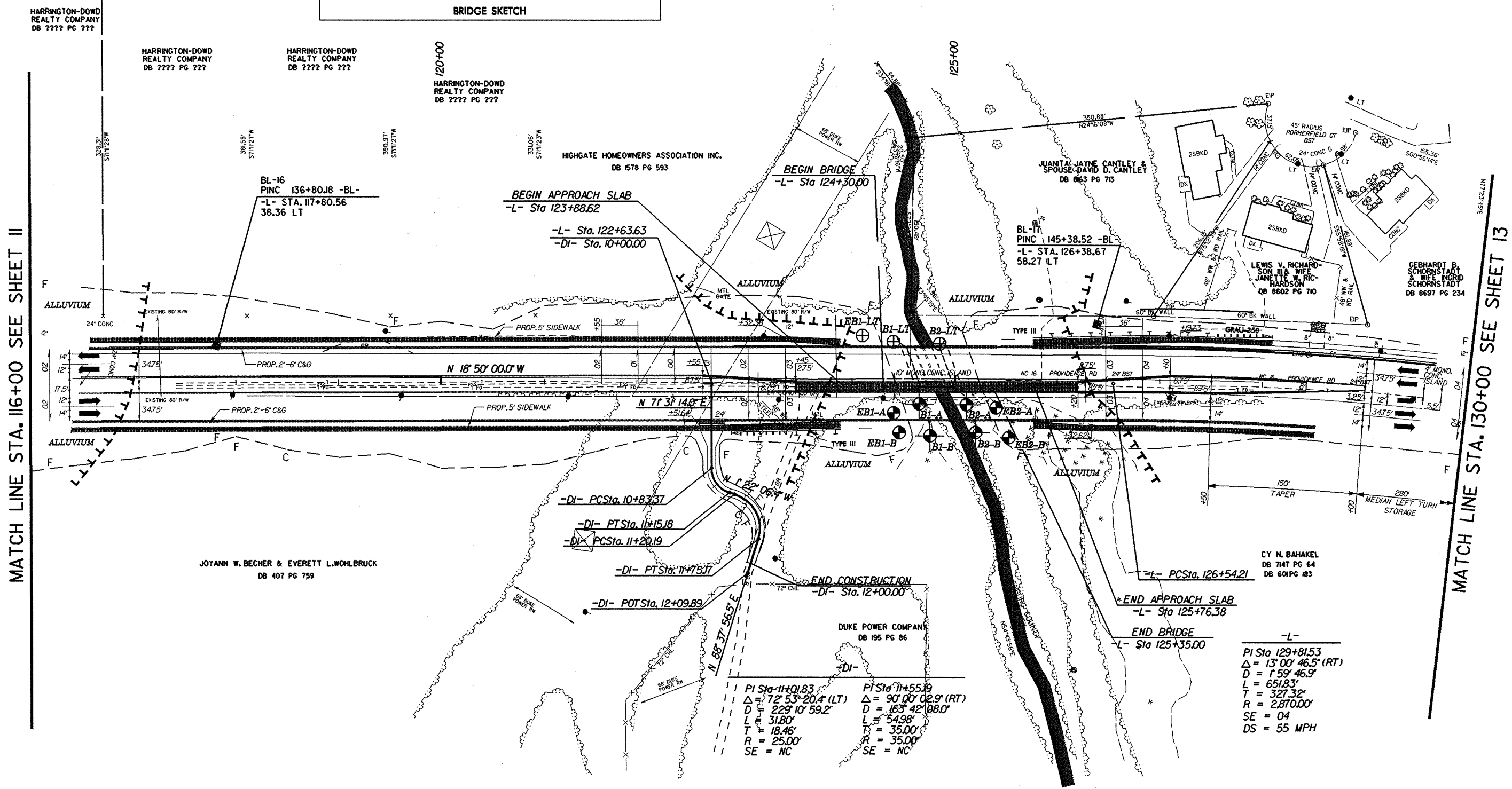
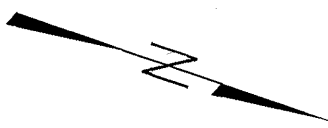
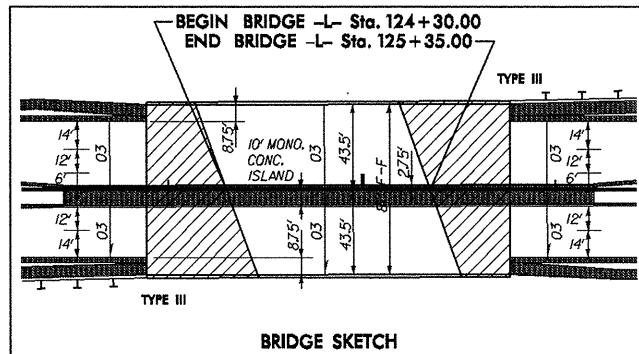
J.E. Beverly, Project Geologist



REVISIONS

TRANSITE CONSULTING
ENGINEERS, INC. INCORPORATED
1800 Piedmont Drive, Suite 6-10
Raleigh, N.C. 27607

PROJECT REFERENCE NO. U-2510A	SHEET NO. 124
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	



MATCH LINE STA. 116+00 SEE SHEET 11

MATCH LINE STA. 130+00 SEE SHEET 13

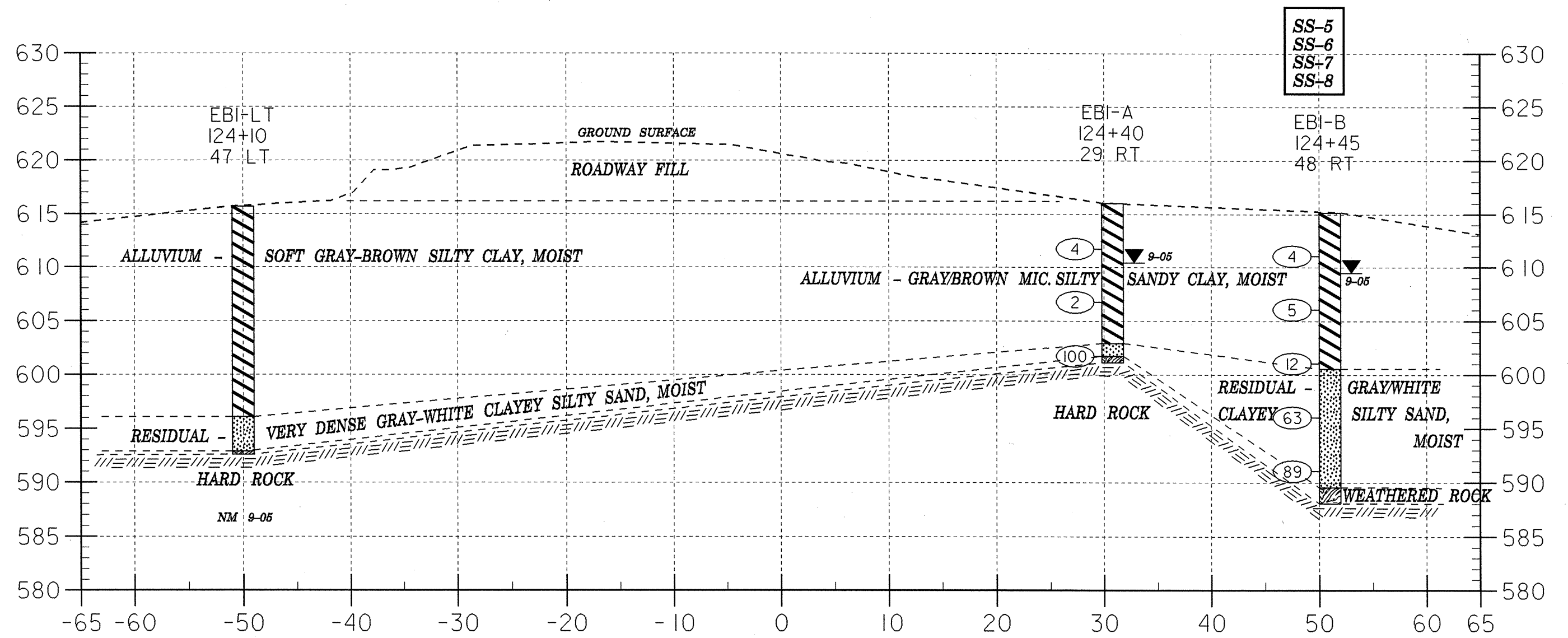
PI Sta 11+01.83 $\Delta = 72^\circ 53' 20.4''$ (LT) $D = 229' 10'' 59.2''$ $L = 31.80'$ $T = 18.46'$ $R = 25.00'$ SE = NC	PI Sta 11+55.19 $\Delta = 90^\circ 00' 02.9''$ (RT) $D = 163' 42'' 08.0''$ $L = 54.98'$ $T = 35.00'$ $R = 35.00'$ SE = NC
---	---

-L- PI Sta 129+81.53 $\Delta = 13^\circ 00' 46.5''$ (RT) $D = 1' 59' 46.9''$ $L = 651.83'$ $T = 327.32'$ $R = 2,870.00'$ SE = 04 DS = 55 MPH
--

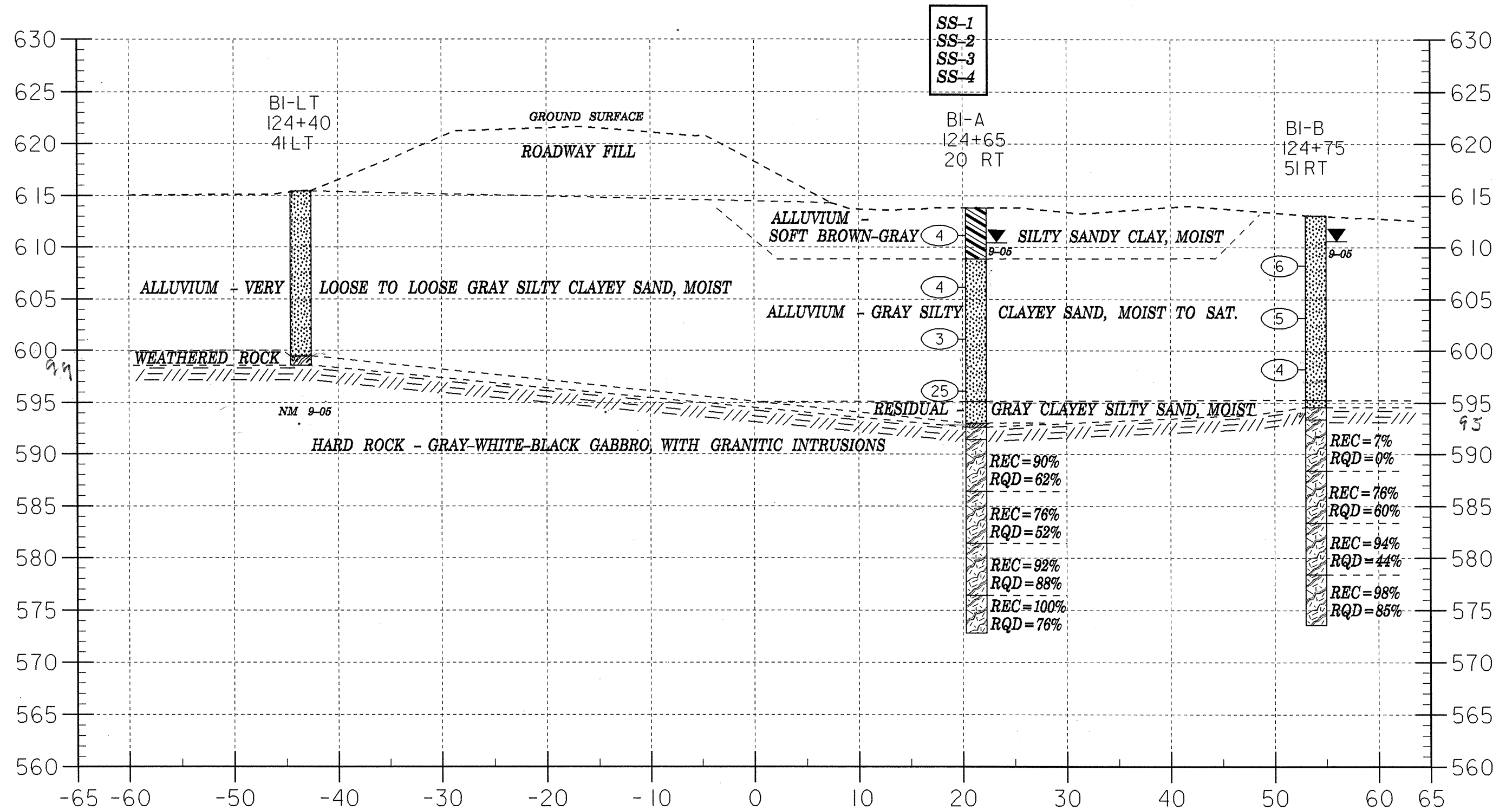
103.001.002.Roadway/Proj/U2510A_rdy_psh12

SEE SHEET 25 & 26 FOR -L- PROFILE
SEE SHEET 30 FOR -DI- PROFILE

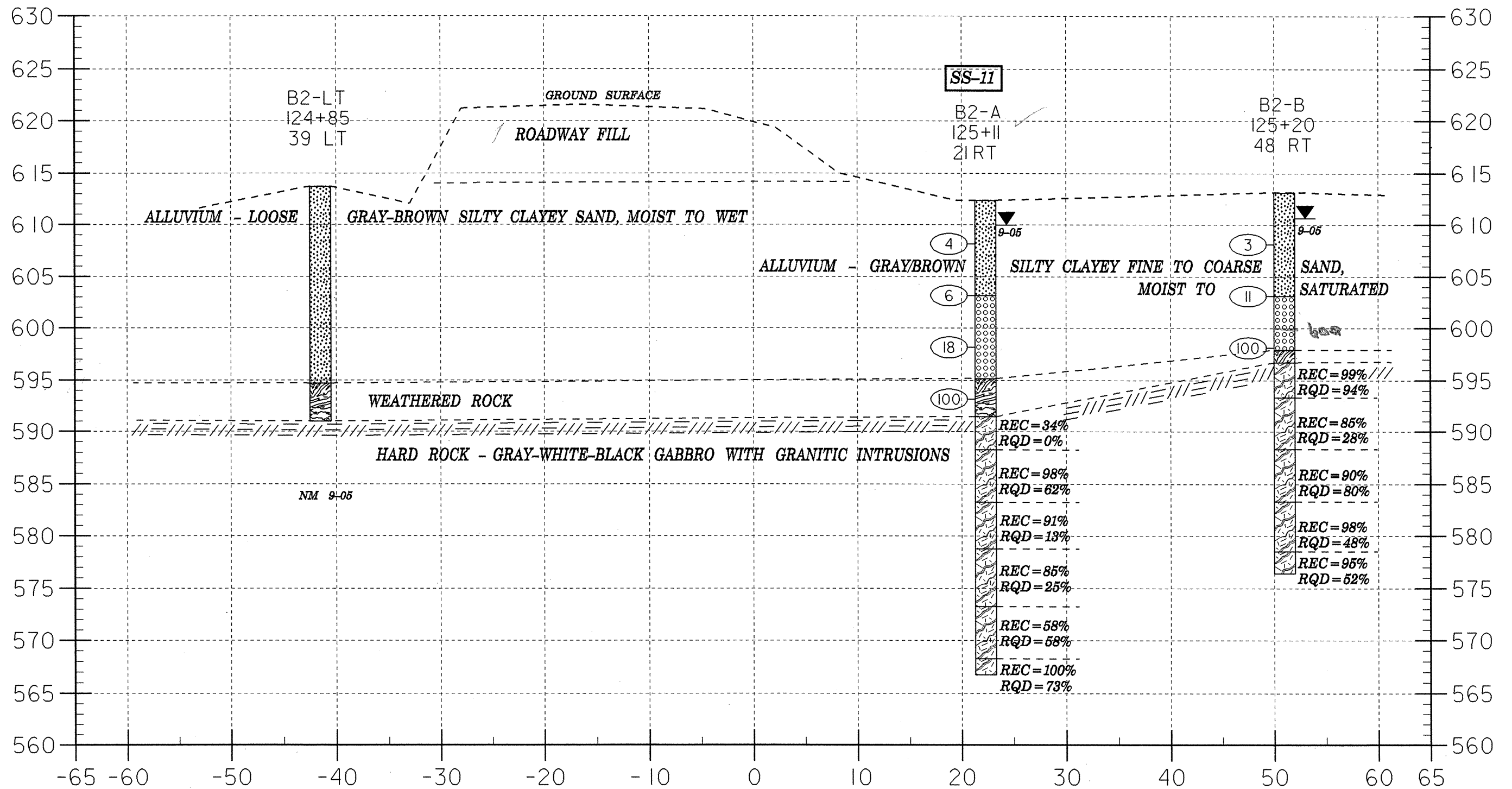
SECTION THROUGH END BENT 1 BORINGS (ALONG 70 DEG. SKEW)



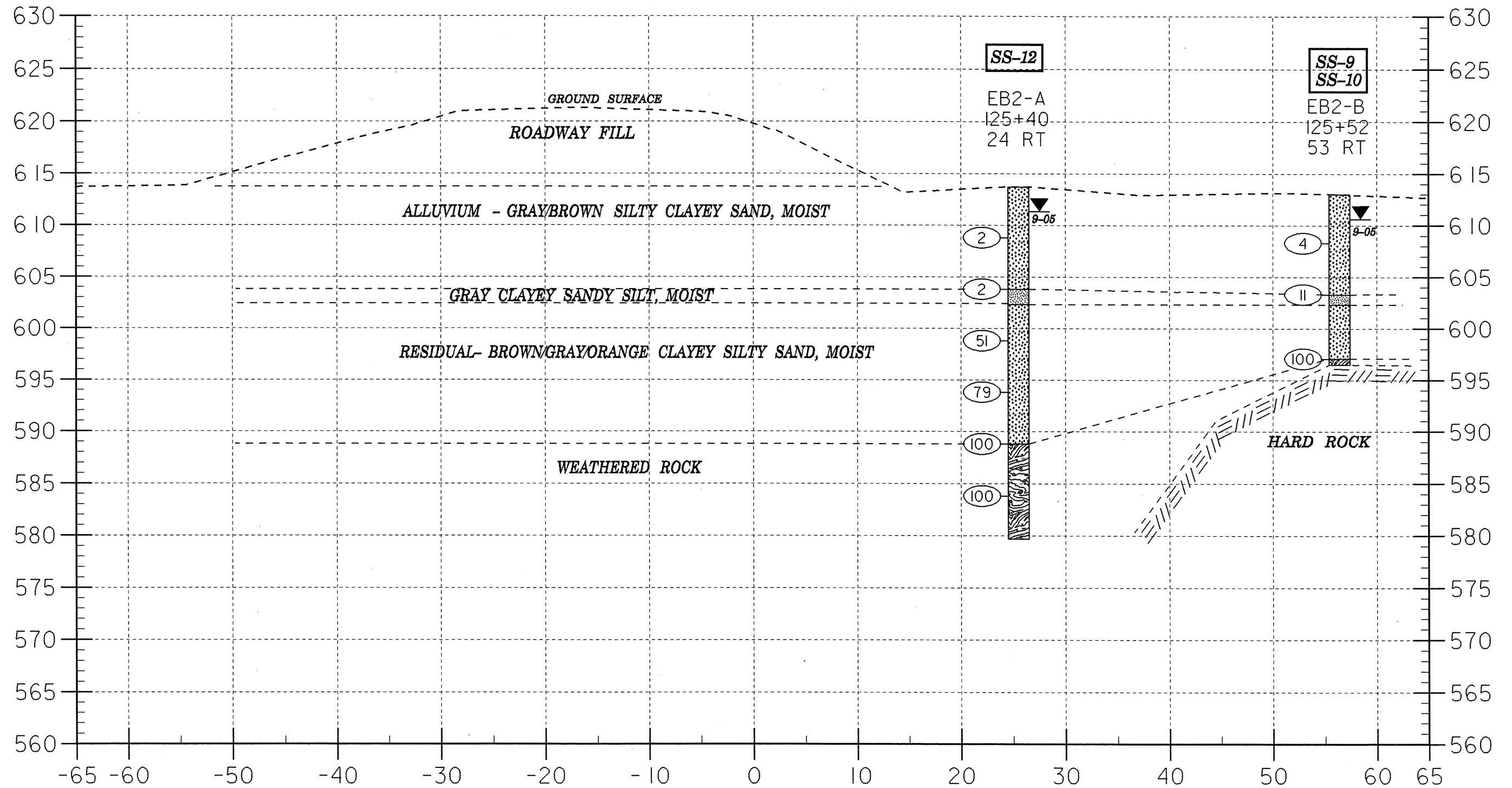
SECTION THROUGH BENT 1 BORINGS (ALONG 70 DEG. SKEW)



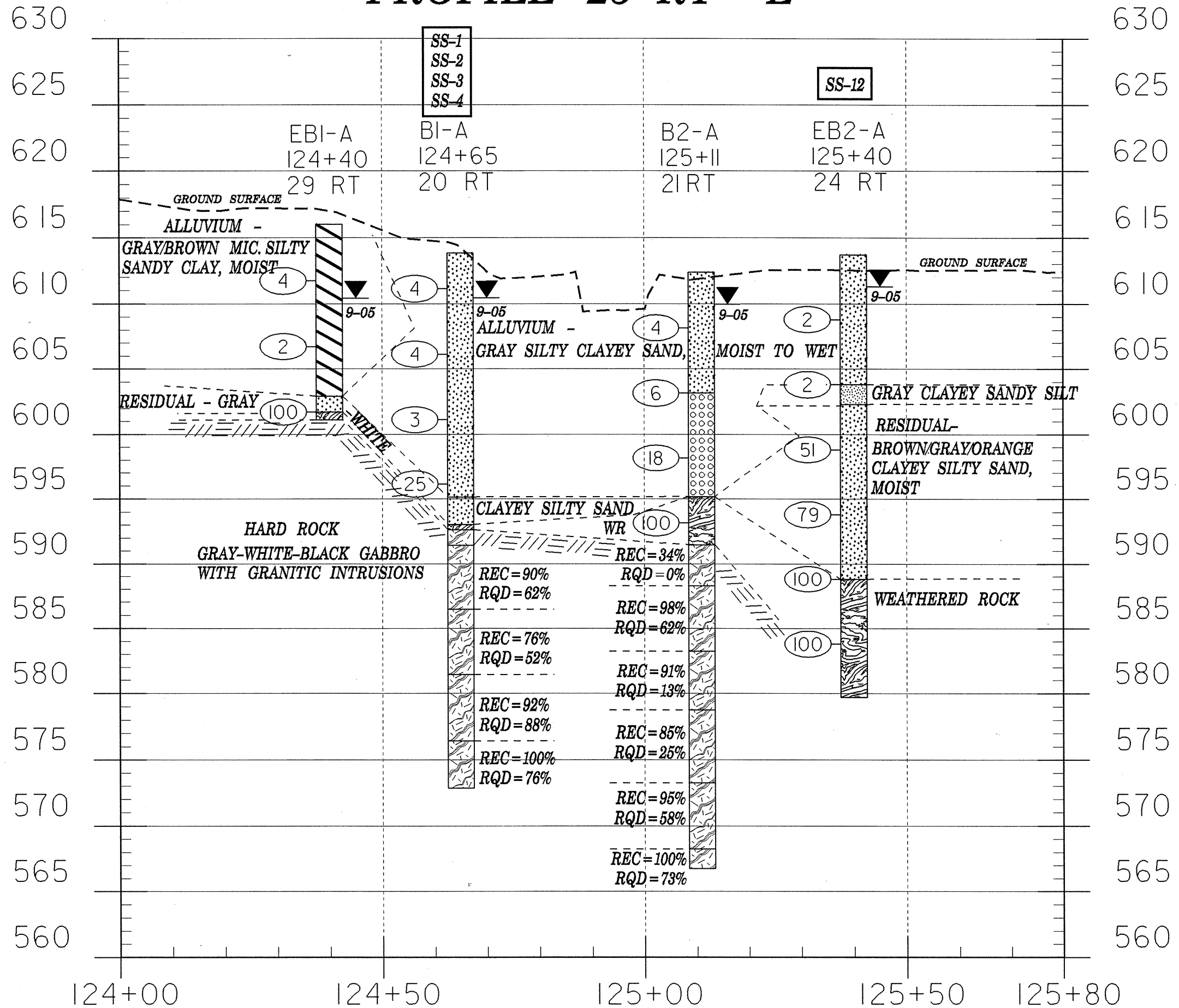
SECTION THROUGH BENT 2 BORINGS (ALONG 70 DEG. SKEW)



SECTION THROUGH END BENT 2 BORINGS (ALONG 70 DEG. SKEW)



PROFILE 25' RT -L-



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY							
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK							GND WATER						
BORING NO EB1-A		NORTHING 0.00		EASTING 0.00		0 HR 5.90ft							
ALIGNMENT L		BORING LOCATION 124+40.000		OFFSET 29.00ft RT		24 HR 5.60ft							
COLLAR ELEV 616.03ft		TOTAL DEPTH 14.90ft		START DATE 9/01/05		COMPLETION DATE 09/01/05							
DRILL MACHINE CME-550X			DRILL METHOD NW CASING			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK 14.30ft			Log EB1-A, 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
616.03													Ground Surface
	4.30	1	2	2	1.5								ALLUVIUM - GRAY/BROWN MIC. SILTY SANDY CLAY
610.00	9.30	0	0	2	1.5								
601.13	14.30	100			0.1								RESIDUAL - GRAY/WHITE CLAYEY SILTY SAND WEATHERED ROCK
REFUSAL ON HARD ROCK AT ELEVATION 601.13'													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY							
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK							GND WATER						
BORING NO EB1-B		NORTHING 0.00		EASTING 0.00		0 HR 6.30ft							
ALIGNMENT L		BORING LOCATION 124+45.000		OFFSET 48.00ft RT		24 HR 5.70ft							
COLLAR ELEV 615.15ft		TOTAL DEPTH 27.10ft		START DATE 9/01/05		COMPLETION DATE 09/01/05							
DRILL MACHINE CME-550X			DRILL METHOD NW CASING			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK 25.60ft			Log EB1-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
615.15													Ground Surface
	4.10	2	2	2	1.5								ALLUVIUM - GRAY/BROWN SANDY SILTY CLAY
610.00	9.10	2	2	3	1.5								
	14.10	3	5	7	1.5								RESIDUAL - GRAY/WHITE CLAYEY SILTY SAND
600.00	19.10	23	30	33	1.5								
	24.10	18	17	72	1.5								WEATHERED ROCK
590.00													
588.05													
BORING TERMINATED ON HARD ROCK AT ELEVATION 588.05'													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

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

PROJECT NO 34813.1.1	ID U-2510A	COUNTY MECKLENBURG	GEOLOGIST JAY STICKNEY
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK			GND WATER
BORING NO B1-A	NORTHING 0.00	EASTING 0.00	0 HR 3.40ft
ALIGNMENT L	BORING LOCATION 124+65.000	OFFSET 20.00ft RT	24 HR 3.40ft
COLLAR ELEV 613.84ft	TOTAL DEPTH 41.00ft	START DATE 8/31/05	COMPLETION DATE 08/31/05
DRILL MACHINE CME-550X	DRILL METHOD SPT CORE BORING	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH		DEPTH TO ROCK 21.20ft	Log B1-A, Page 1 of 1

PROJECT NO: 34813.1.1 PROJECT ID: U2510 COUNTY: Mecklenburg GEOLOGIST: J.K. STICKNEY
 SITE DESCRIPTION: Bridge on NC 16 over Six Mile Creek DRILLER: C.L. SMITH
 BORING NO: B1-A BORING LOCATION (STA): 124+65 OFFSET: 20 RT
 COLLAR ELEV: 613.84 PERSONNEL: HKW CORE SIZE: NXWL
 TOTAL DEPTH: 41 DRILL MACHINE: CME-550 DATE STARTED: 08/31/05
 TOTAL RUN: 19.8 DRILL EQUIP: NX-CASING, TRICONE DATE COMPLETED: 08/31/05

ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
613.84														
														Ground Surface
610.00	2.70	1	2	2	1.5							SS-1	M	ALLUVIUM - SOFT BROWN-GRAY SILTY SANDY CLAY
	7.70	6	2	2	1.5							SS-2	MW	ALLUVIUM - GRAY SILTY CLAYEY SAND
600.00	12.70	0	1	2	1.5							SS-3	S	
	17.70	3	5	20	1.5					25		SS-4	M	
590.00												RUN # 1		RESIDUAL - GRAY CLAYEY SILTY SAND
												RUN # 2		WEATHERED ROCK
												RUN # 3		HARD ROCK - GRAY-WHITE-BLACK GABBRO, REC=92% RQD=75%
												RUN # 4		GRAY-WHITE-BLACK GABBRO WITH GRANITIC INTRUSION, REC=90% RQD=62%
580.00												RUN # 5		GRAY-WHITE-BLACK GRANITE AND GABBRO, REC=76% RQD=52%
														GRAY-WHITE-BLACK GABBRO, REC=92% RQD=88%
572.84														GRAY-WHITE-BLACK GABBRO, REC=100% RQD=76%
														CORE BORING TERMINATED IN HARD ROCK AT ELEVATION 572.84'

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
592.64	21.2	NM	1	92	75		Gray/White/Black very slightly weathered, hard, closely fractured, gabbro
591.44	22.4	NM	2	90	62	RS-1	As above with a granitic intrusion starting at 588.84' and extending into Run 3
586.44	27.4	NM	3	76	52		Granitic intrusion stops at 586.24' and returns back to a gray/white/black very slightly weathered, hard, closely fractured, gabbro
581.44	32.4	NM	4	92	88		Gray/White/Black fresh hard v.closely fractured, gabbro
576.44	37.4	NM	5	100	76		Same as Run 4
572.84	41.0						

NOTES

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

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

PROJECT NO 34813.1.1	ID U-2510A	COUNTY MECKLENBURG	GEOLOGIST JAY STICKNEY
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK			GND WATER 0 HR 3.10ft 24 HR 2.50ft
BORING NO B1-B	NORTHING 0.00	EASTING 0.00	
LIGNMENT L	BORING LOCATION 124+75.000	OFFSET 51.00ft RT	
COLLAR ELEV 613.09ft	TOTAL DEPTH 39.50ft	START DATE 8/31/05	COMPLETION DATE 08/31/05
DRILL MACHINE CME-550X	DRILL METHOD SPT CORE BORING	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH		DEPTH TO ROCK 18.50ft	Log B1-B, Page 1 of 1

PROJECT NO: 34813.1.1 PROJECT ID: U2510 COUNTY: Mecklenburg GEOLOGIST: J.K. STICKNEY
 SITE DESCRIPTION: Bridge on NC 16 over Six Mile Creek DRILLER: C.L. SMITH
 BORING NO: B1-B BORING LOCATION (STA): 124+75 OFFSET: 51 RT
 COLLAR ELEV: 613.09 PERSONNEL: HKW CORE SIZE: NXWL
 TOTAL DEPTH: 39.5 DRILL MACHINE: CME-550 DATE STARTED: 08/31/05
 TOTAL RUN: 21.0 DRILL EQUIP: NX-CASING, TRICONE DATE COMPLETED: 08/31/05

ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
613.09												Ground Surface
610.00	4.90	4	3	3	1.5							ALLUVIUM - GRAY SILTY CLAYEY SAND M/W M/W
	9.90	1	2	3	1.5							
600.00	14.90	1	2	2	1.5							
												RESIDUAL - GRAY CLAYEY SILTY SAND
												HARD ROCK - GRAY-WHITE-BLACK GABBRO, REC=100% RQD=100%
												GRAY-WHITE-BLACK GABBRO, REC=7% RQD=0%
												AS ABOVE, REC=76% RQD=60%
												AS ABOVE, REC=94% RQD=44%
												AS ABOVE, REC=98% RQD=85%
573.59												CORE BORING TERMINATED IN HARD ROCK AT ELEVATION 573.59'

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
594.59	18.5	NM	1	100	100		Gray/White/Black fresh, hard, very closely fractured, gabbro
593.39	19.7	NM	2	7	0		At elevation 593.09' rock turns very soft and severely weathered until elevation 588.74', were it returned back to a gray/white/black gabbro.
588.39	24.7	NM	3	76	60		Gray/White/Black fresh, hard, very close fractured, gabbro
583.39	29.7	NM	4	94	44		A granitic intrusion is found at elevation 583.39' to 581.59'. The remainder of the run is gray/white/black fresh, hard very closely fractured, gabbro
578.39	34.7	NM	5	98	85	RS-2	Gray/Black/White v slightly weathered, hard, very closely fractured, gabbro.
573.59	39.5						

NOTES

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

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

PROJECT NO 34813.1.1	ID U-2510A	COUNTY MECKLENBURG	GEOLOGIST JAY STICKNEY
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK			GND WATER
BORING NO B2-A	NORTHING 0.00	EASTING 0.00	0 HR 2.10ft
ALIGNMENT L	BORING LOCATION 125+11.000	OFFSET 21.00ft RT	24 HR 2.40ft
COLLAR ELEV 612.36ft	TOTAL DEPTH 45.60ft	START DATE 9/01/05	COMPLETION DATE 09/01/05
DRILL MACHINE CME-550X	DRILL METHOD SPT CORE BORING	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH		DEPTH TO ROCK 20.90ft	Log B2-A, Page 1 of 1

PROJECT NO: 34813.1.1 PROJECT ID: U2510 COUNTY: Mecklenburg GEOLOGIST: J.K. STICKNEY
 SITE DESCRIPTION: Bridge on NC 16 over Six Mile Creek DRILLER: C.L. SMITH
 BORING NO: B2-A BORING LOCATION (STA): 125+11 OFFSET: 21RT
 COLLAR ELEV: 612.36 PERSONNEL: HKW CORE SIZE: NXWL
 TOTAL DEPTH: 45.6 DRILL MACHINE: CME-550 DATE STARTED: 09/06/05
 TOTAL RUN: 24.7 DRILL EQUIP: NX-CASING, TRICONE DATE COMPLETED: 09/14/05

ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75	100				
612.36														
610.00	4.20	0	2	2	1.5	4								ALLUVIUM - GRAY/BROWN SILTY CLAYEY SAND
	9.20	1	2	4	1.5	6								GRAY SILTY CLAYEY SAND
600.00	14.20	12	8	10	1.5	18								WEATHERED ROCK
597.97	19.20	100			0.3	100								HARD ROCK - GRAY-WHITE-BLACK GABBRO, REC=34% RQD=0%
590.00														AS ABOVE, REC=98% RQD=62%
														GRAY-WHITE-BLACK GABBRO WITH GRANITE INTRUSION, REC=91% RQD=13%
														GRAY-WHITE-BLACK GABBRO, REC=85% RQD=25%
														AS ABOVE, REC=95% RQD=58%
570.00														AS ABOVE, REC=100% RQD=73%
566.76														CORE BORING TERMINATED IN HARD ROCK AT ELEVATION 566.76'

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
591.46	20.9	NM	1	34	0		Gray/White/Black moderately hard and weathered, closely fractured, gabbro.
588.26	24.1	NM	2	98	62		Same as Run # 1
583.26	29.1	NM	3	91	13		Gray/White/Black moderately severe weathering, closely fractured, gabbro, with a small granitic intrusion of 0.2 tenths thick starting at elevation 581.96'.
578.76	33.6	NM	4	85	25		Gray/White/Black moderately severe weathering, closely fractured, gabbro.
573.26	39.1	NM	5	95	58	RS-3	Gray/White/Black very slight weathered, hard, closely fractured, gabbro.
568.26	44.1	NM	6	100	73		Same as Run # 5
566.76	45.6						
NOTES							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

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

PROJECT NO: 34813.1.1 PROJECT ID: U2510 COUNTY: Mecklenburg GEOLOGIST: J.K. STICKNEY
 SITE DESCRIPTION: Bridge on NC 16 over Six Mile Creek DRILLER: C.L. SMITH
 BORING NO: B2-B BORING LOCATION (STA): 125+20 OFFSET: 48 RT
 COLLAR ELEV: 613.12 PERSONNEL: HKW CORE SIZE: NXWL
 TOTAL DEPTH: 36.7 DRILL MACHINE: CME-550 DATE STARTED: 09/01/05
 TOTAL RUN: 20.3 DRILL EQUIP: NX-CASING, TRICONE DATE COMPLETED: 09/01/05

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY								
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK						GND WATER								
BORING NO B2-B		NORTHING 0.00		EASTING 0.00		0 HR 1.30ft								
ALIGNMENT L		BORING LOCATION 125+20.000		OFFSET 48.00ft RT		24 HR 2.50ft								
COLLAR ELEV 613.12ft		TOTAL DEPTH 36.70ft		START DATE 9/01/05		COMPLETION DATE 09/01/05								
DRILL MACHINE CME-550X			DRILL METHOD SPT CORE BORING			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH N/A			DEPTH TO ROCK 16.40ft			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				
613.12														Ground Surface
610.00	5.00	1	2	1	1.5	3								ALLUVIUM - GRAY/BROWN SILTY CLAYEY SAND
	10.00	4	5	6	1.5	11					SS-11	M/W		GRAY SILTY CLAYEY SAND
600.00	15.00	100			0.2									WEATHERED ROCK
														HARD ROCK - GRAY-WHITE-BLACK GABBRO, REC=99% RQD=94%
590.00														AS ABOVE, REC=85%, RQD=28%
														AS ABOVE, REC=90% RQD=80%
														AS ABOVE, REC=98% RQD=48%
576.42														AS ABOVE, REC=95% RQD=52%
CORE BORING TERMINATED IN HARD ROCK AT ELEVATION 576.42'														

ELEV. (FT)	DEPTH (FT)	DRILL RATE (MIN/1.0 FT)	RUN NO.	REC % (FT)	RQD % (FT)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
596.72	16.4	NM	1	99	94	RS-4	Gray/White/Black fresh, hard, closely fractured, gabbro
593.32	19.8	NM	2	85	28		A granitic intrusion at the top of run two extends to elevation 591.67', reappears at elevation 591.32' to 590.92'. The rest of the run is same as Run # 1.
588.32	24.8	NM	3	90	80		Same as Run # 1
583.32	29.8	NM	4	98	48		Same as Run # 1, with a moderately weathered seam the last one foot of the run.
578.52	34.6	NM	5	95	52		Gray/White/Black very slightly weathered, hard, closely fractured, gabbro.
576.42	36.7						
NOTES							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY							
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK							GND WATER						
BORING NO B2-LT		NORTHING 0.00		EASTING 0.00		0 HR 3.20ft							
ALIGNMENT L		BORING LOCATION 124+85.000		OFFSET 39.00ft LT		24 HR N/A							
COLLAR ELEV 613.70ft		TOTAL DEPTH 22.70ft		START DATE 9/13/05		COMPLETION DATE 09/13/05							
DRILL MACHINE CME-550X			DRILL METHOD SOLID AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK 22.70ft			Log B2-LT, 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
613.70													
													Ground Surface
610.00											M		ALLUVIUM - LOOSE GRAY-BROWN SILTY CLAYEY SAND
600.00											M/W		
591.00													WEATHERED ROCK
													AUGER REFUSAL ON HARD ROCK AT ELEVATION 591.0'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY						
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK							GND WATER					
BORING NO EB2-A		NORTHING 0.00		EASTING 0.00		0 HR 0.00ft						
ALIGNMENT L		BORING LOCATION 125+40.000		OFFSET 24.00ft RT		24 HR 2.40ft						
COLLAR ELEV 613.71ft		TOTAL DEPTH 34.00ft		START DATE 9/14/05		COMPLETION DATE 09/14/05						
DRILL MACHINE CME-550X			DRILL METHOD NW CASING			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log EB2-A, 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			
613.71												Ground Surface
610.00	4.90	1	1	1	1.5	2						ALLUVIUM - GRAY/BROWN SILTY CLAYEY SAND
	9.90	1	1	1	1.5	2						GRAY CLAYEY SANDY SILT
600.00	14.90	19	23	28	1.5	51				SS-12	M	RESIDUAL - BROWN/GRAY/ORANGE CLAYEY SILTY SAND
	19.90	28	34	45	1.5	70						WEATHERED ROCK
590.00	24.90	72	28		0.7	100						
	29.90	100			0.3	100						
590.00												BORING TERMINATED IN WEATHERED ROCK AT ELEVATION 579.7'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34813.1.1		ID U-2510A		COUNTY MECKLENBURG		GEOLOGIST JAY STICKNEY						
SITE DESCRIPTION BRIDGE ON NC 16 OVER SIX MILE CREEK							GND WATER					
BORING NO EB2-B		NORTHING 0.00		EASTING 0.00		0 HR 1.00ft						
ALIGNMENT L		BORING LOCATION 125+52.000		OFFSET 53.00ft RT		24 HR 2.40ft						
COLLAR ELEV 613.00ft		TOTAL DEPTH 16.50ft		START DATE 9/01/05		COMPLETION DATE 09/01/05						
DRILL MACHINE CME-550X			DRILL METHOD NW CASING			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH N/A			DEPTH TO ROCK 16.50ft			Log EB2-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			
613.00												Ground Surface
610.00	4.70	0	2	2	1.5	4				SS-9	M	ALLUVIUM - GRAY/BROWN SILTY CLAYEY SAND
	9.70	0	0	11	1.5	11				SS-10	M	GRAY SILTY CLAYEY SAND
600.00	14.70	20	22	78	1.4	100						RESIDUAL - BROWN/GRAY/ORANGE SILTY CLAYEY SAND
596.50												WEATHERED ROCK
												BORING REFUSED ON HARD ROCK AT ELEVATION 596.5'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY

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SOILS LABORATORY

T. I. P. No. U2510A

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REPORT ON SAMPLES OF SOILS FOR QUALITY

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Project 34813.1.1 County MECKLENBURG Owner _____
Date: Sampled _____ Received 9/23805 Reported 9/27/2005
Sampled from BRIDGE By J E BEVERLY
Submitted by N WAINAINA 1995 Standard Specifications

Project 34813.1.1 County MECKLENBURG Owner _____
Date: Sampled _____ Received 9/23805 Reported 9/27/2005
Sampled from BRIDGE By J E BEVERLY
Submitted by N WAINAINA 1995 Standard Specifications

726071 TO 726082
8/3/06

726071 TO 726082
8/3/06

TEST RESULTS

Proj. Sample No.	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6
Lab. Sample No.	726071	726072	726073	726074	726075	726076
Retained #4 Sieve %	-	-	-	5	-	-
Passing #10 Sieve %	99	96	95	92	100	100
Passing #40 Sieve %	92	79	70	79	98	92
Passing #200 Sieve %	64	26	30	22	82	53

TEST RESULTS

Proj. Sample No.	SS-7	SS-8	SS-9	SS-10	SS-11	SS-12
Lab. Sample No.	726077	726078	726079	726080	726081	726082
Retained #4 Sieve %	-	-	-	-	-	-
Passing #10 Sieve %	100	100	96	98	84	99
Passing #40 Sieve %	82	81	70	85	29	73
Passing #200 Sieve %	21	20	29	45	6	24

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	10.5	34.4	38.7	25.5	4.7	19.8
Fine Sand Ret - #270 %	30.4	43.5	34.8	57.3	18.2	33.0
Silt 0.05 - 0.005 mm %	22.7	7.9	12.3	9.1	28.5	14.8
Clay < 0.005 mm %	36.4	14.2	14.2	8.1	48.6	32.4
Passing #40 Sieve %	-	-	-	-	-	-
Passing #200 Sieve %	-	-	-	-	-	-

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%						
Coarse Sand Ret - #60 %	38.3	40.5	41.1	19.4	79.4	42.7
Fine Sand Ret - #270 %	46.4	44.3	33.4	41.5	14.8	39.1
Silt 0.05 - 0.005 mm %	11.3	10.1	8.3	16.8	1.8	13.2
Clay < 0.005 mm %	4.0	5.1	17.2	22.3	4.0	5.1
Passing #40 Sieve %	-	-	-	-	-	-
Passing #200 Sieve %	-	-	-	-	-	-

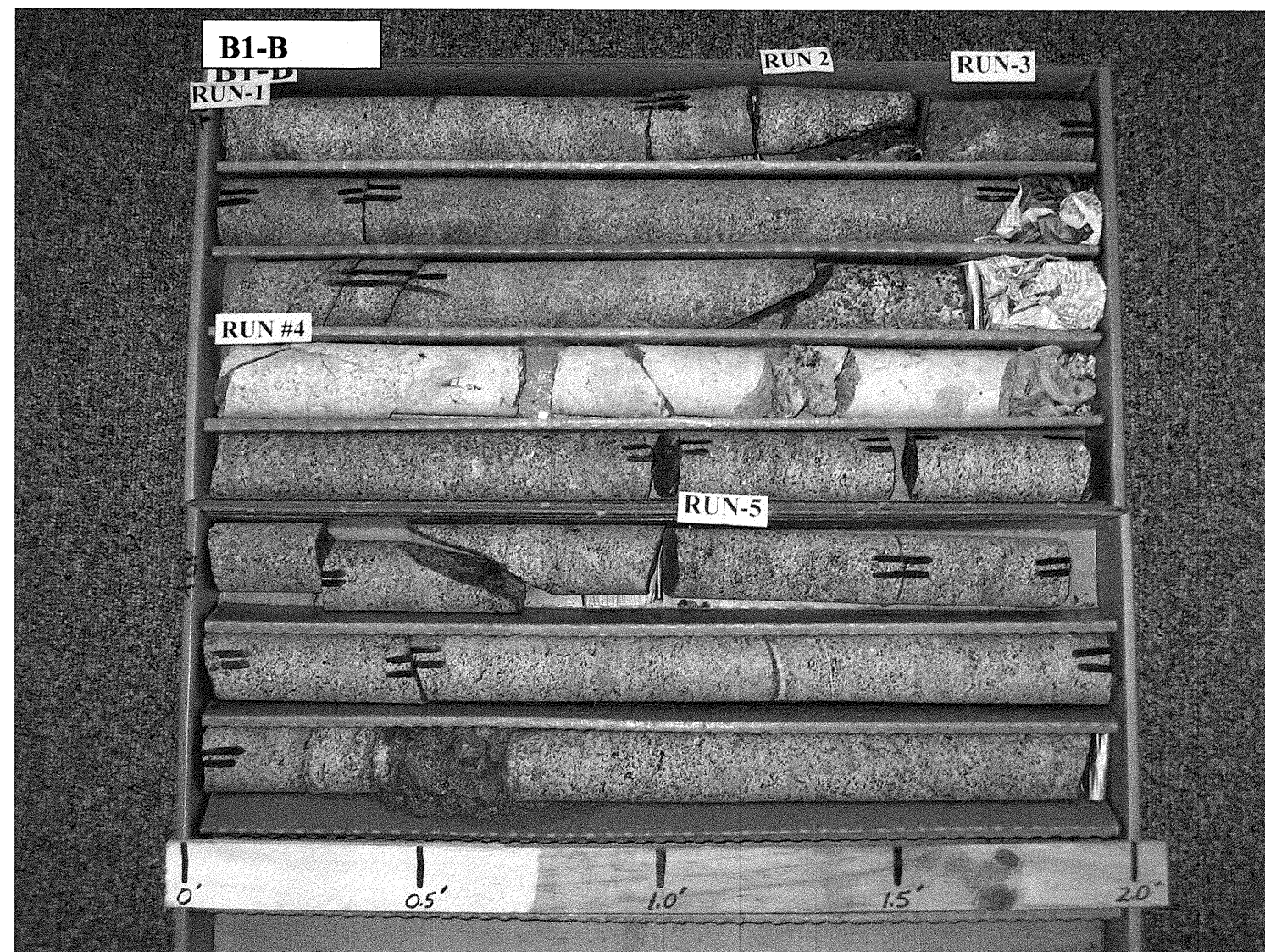
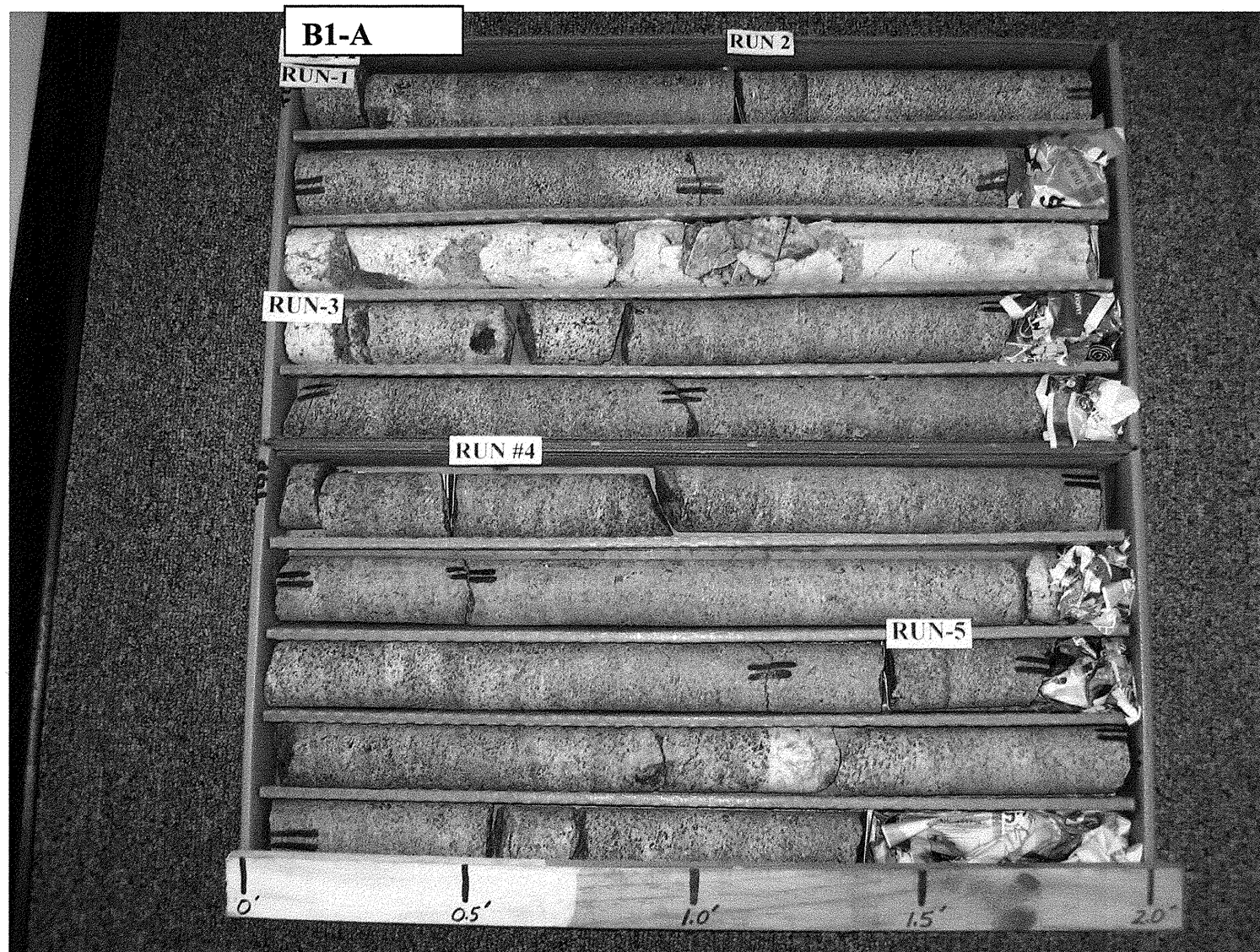
L. L.	37	25	34	23	44	43
P. I.	11	NP	6	NP	18	16
AASHTO Classification	A-6(6)	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-7-6(16)	A-7-6(6)
Station	124+65	124+65	124+65	124+65	124+45	124+45
ALIGNMENT	20 RT	20 RT	20 RT	20 RT	48 RT	48 RT
Hole No.	L	L	L	L	L	L
Depth (Ft)	3.20	8.20	13.20	18.20	4.60	9.60
to	4.20	9.20	14.20	19.20	5.60	10.60

L. L.	28	22	23	32	23	22
P. I.	NP	NP	4	10	NP	NP
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-4(2)	A-1-b(0)	A-2-4(0)
Station	124+45	124+45	125+52	125+52	125+20	125+40
ALIGNMENT	48 RT	48 RT	53 RT	53 RT	48 RT	24 RT
Hole No.	L	L	L	L	L	L
Depth (Ft)	14.60	19.60	5.20	9.70	10.50	15.40
to	15.60	20.60	6.20	10.70	11.50	16.40

cc: J E BEVERLY
Soils File

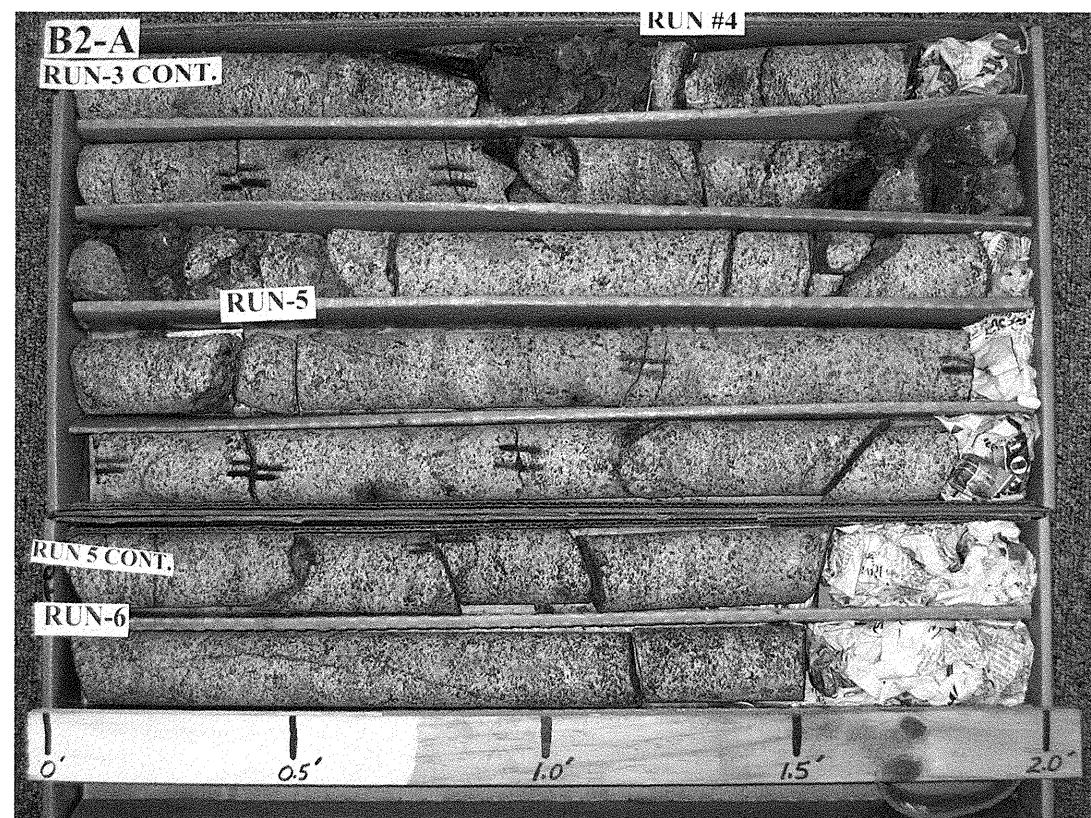
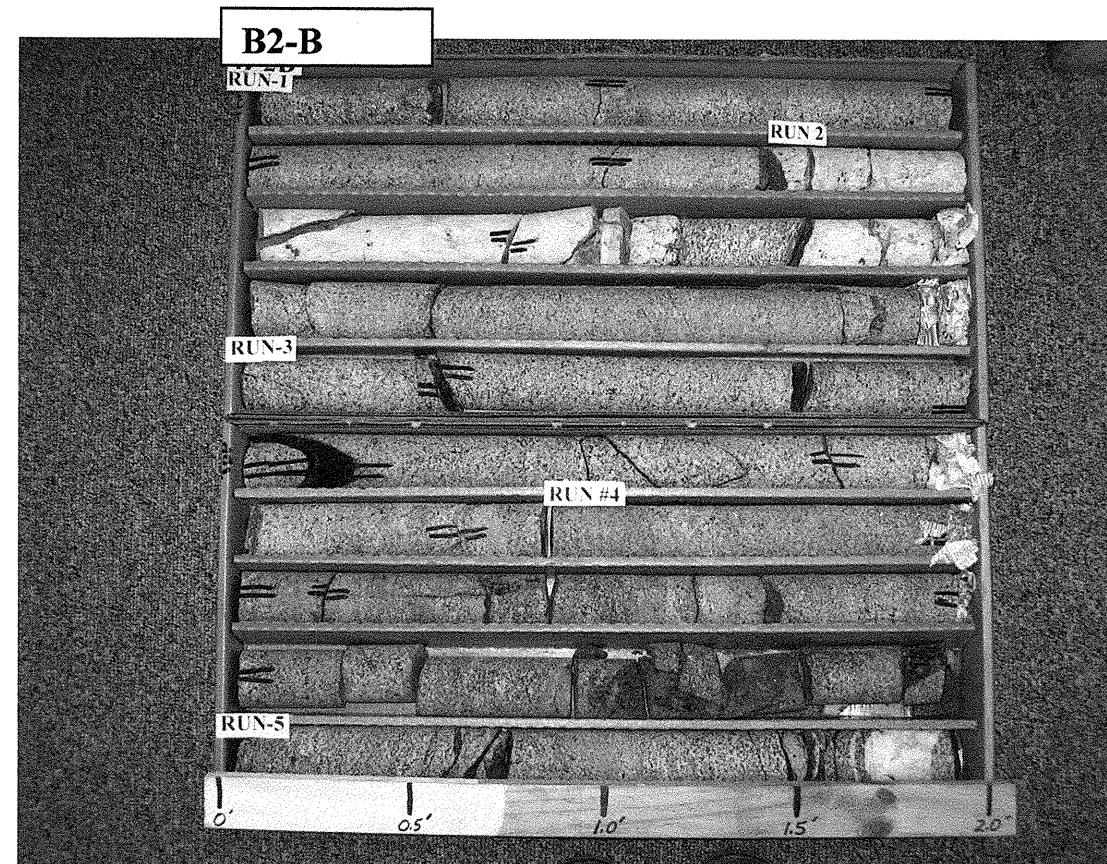
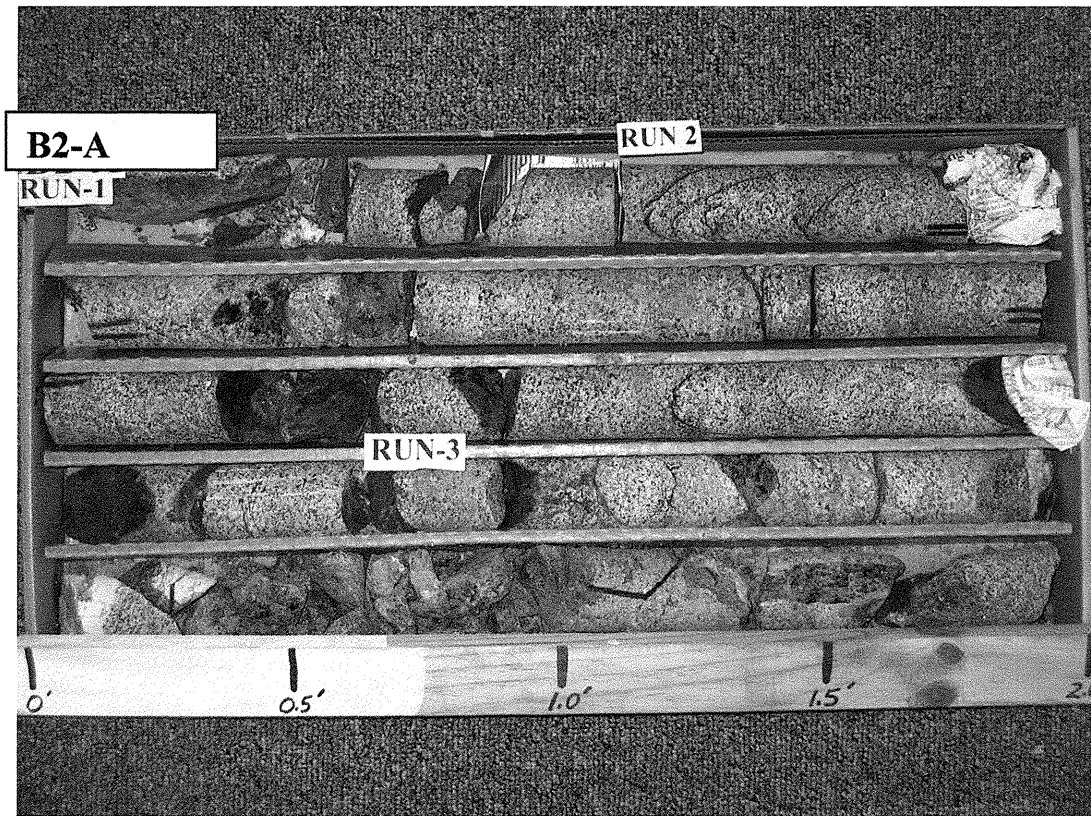
34813.1.1 (U-2510A)
MECKLENBURG / UNION COUNTY
BRIDGE ON NC 16 OVER SIX MILE CREEK

CORE PHOTOS



34813.1.1 (U-2510A)
MECKLENBURG / UNION COUNTY
BRIDGE ON NC 16 OVER SIX MILE CREEK

CORE PHOTOS



GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 34813.1.11 TIP NO.: U-2510A COUNTY: Mecklenburg

DESCRIPTION(1): Bridge over Six Mile Creek on NC 16 between SR 3628 and SR 1346

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

COUNTY BRIDGE NO. NA BRIDGE LENGTH NO. BENTS NO. BENTS IN: CHANNEL FLOODPLAIN

FOUNDATION TYPE: Current structure is a four barrel culvert

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: None

INTERIOR BENTS: None

CHANNEL BED: None

CHANNEL BANKS: None

◆ **EXISTING SCOUR PROTECTION:**

TYPE(3): None

EXTENT(4): None

EFFECTIVENESS(5): None

OBSTRUCTIONS(6) (DAMS, DEBRIS, ETC.): Tree limbs

◆ **DESIGN INFORMATION**

CHANNEL BED MATERIAL(7) (Sample Results Attached): Gray silty clayey sand (A-2-4)

CHANNEL BANK MATERIAL(8) (Sample Results Attached): Brown/Gray silty sandy clay (A-6)

CHANNEL BANK COVER(10): Mature trees and shrubs

FLOOD PLAIN WIDTH(11): 123+50 - 127+00

FLOOD PLAIN COVER(12): Mature trees and shrubs

STREAM IS: DEGRADING AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: x

◆
 ◆
 ◆ **DESIGN INFORMATION CONT.**

CHANNEL MIGRATION TENDENCY(14): Slight

GEOTECHNICAL ADJUSTED SCOUR ELEVATIONS (15):

The NCDOT Hydraulics Report predicts the 100 year scour for Bent 1 and Bent 2 at elevation 597 feet (17' of scour) and the 500 year scour at elevation 595 feet (19' of scour).

Based on boring data and the presence of alluvial sand the Geotechnical Engineering Unit concurs with the current scour analysis of the NCDOT Hydraulics Unit. One slight exception might be considered along the left lane of Bent 1 where weathered and hard rock were documented in a single boring at elevation 599.0 feet.

REPORTED BY: JKS / JEB DATE: Sept 14, 2005

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 FOUNDATION BEARING MATERIAL
- (10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIPRAP, NONE, ETC.)
- (11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
- (12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
- (13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
- (14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE Laterally DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
- (15) 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.