

CONTRACT: 33713.1.2 ID: B-4463

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

BRIDGE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33713.3.1 (B-4463) F.A. PROJ. STP-0032(8)
 COUNTY CHOWAN
 PROJECT DESCRIPTION BRIDGE NO. 12 ON NC 32 OVER QUEEN ANNE CREEK AT -L- STA 21+24

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33713.1.2 (B-4463)	1	10
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33713.1.2	STP-0032(8)	P.E.	
		RW & UTIL.	

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 1939 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

PERSONNEL

CMW

SCD

JRS

RES

JME

INVESTIGATED BY C.M. WRIKE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE SEPTEMBER 2009

DRAWN BY: C.R. SUMNER, C.M. WRIKE

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. B-4463	SHEET NO. 2 OF 10
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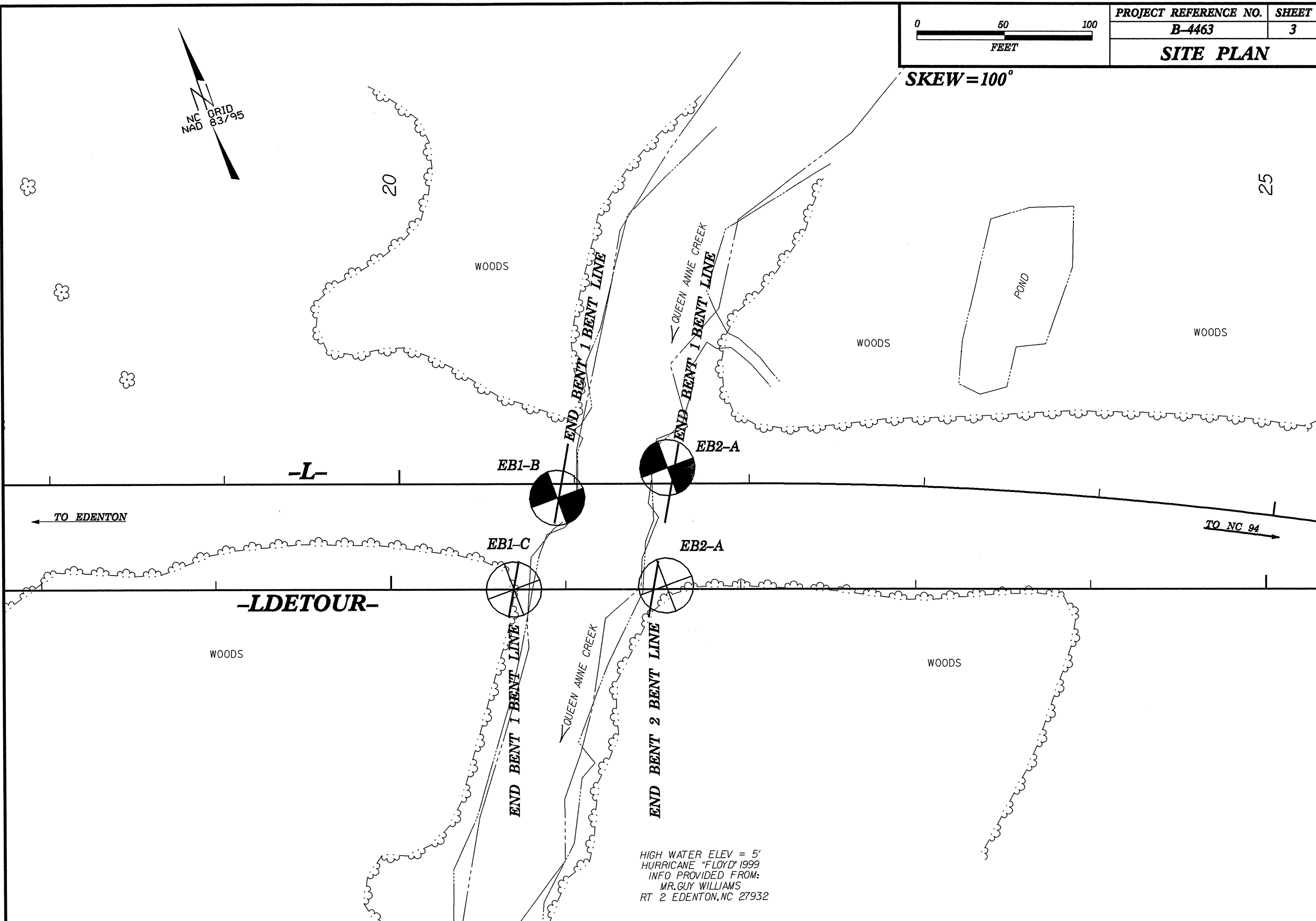
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</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) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FML) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		MISCELLANEOUS SYMBOLS	
<p>GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p> <p>GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7</p> <p>SYMBOL</p> <p>% PASSING: 10, 40, 200</p> <p>LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX</p> <p>USUAL TYPES OF MAJOR MATERIALS: STONE FRAGS., GRAVEL, SAND, FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND, SILTY SOILS, CLAYEY SOILS</p> <p>GENERAL RATING AS A SUBGRADE: EXCELLENT TO GOOD, FAIR TO POOR, POOR, UNSUITABLE</p> <p>PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30</p>		<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KADLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY: SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE</p> <p>PERCENTAGE OF MATERIAL: ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, OTHER MATERIAL</p> <p>GROUND WATER: 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</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. IF TESTED, WOULD YIELD SPT REFUSAL.</p> <p>SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.</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. IF TESTED, YIELDS SPT N VALUES < 100 BPF.</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>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SOUNDING ROD</p> <p>SPT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>SPT N-VALUE</p> <p>SPT REFUSAL</p>	
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS		ABBREVIATIONS	
<p>PRIMARY SOIL TYPE: COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</p> <p>GENERALLY GRANULAR MATERIAL (NON-COHESIVE): VERY LOOSE, MEDIUM DENSE, DENSE, VERY DENSE</p> <p>GENERALLY SILT-CLAY MATERIAL (COHESIVE): VERY SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD</p>		<p>AR - AUGER REFUSAL</p> <p>BT - BORING TERMINATED</p> <p>CL - CLAY</p> <p>CPT - CONE PENETRATION TEST</p> <p>CSE - COARSE</p> <p>DMT - DILATOMETER TEST</p> <p>DPT - DYNAMIC PENETRATION TEST</p> <p>F - FINE</p> <p>FOSS. - FOSSILIFEROUS</p> <p>FRAC. - FRACTURED, FRACTURES</p> <p>FRAGS. - FRAGMENTS</p> <p>HI. - HIGHLY</p> <p>MED. - MEDIUM</p> <p>MICA. - MICACEOUS</p> <p>MOD. - MODERATELY</p> <p>NP - NON PLASTIC</p> <p>ORG. - ORGANIC</p> <p>PMT - PRESSUREMETER TEST</p> <p>SAP. - SAPROLITIC</p> <p>SD. - SAND, SANDY</p> <p>SL. - SILT, SILTY</p> <p>SLI. - SLIGHTLY</p> <p>TCR - TRICONE REFUSAL</p> <p>W - MOISTURE CONTENT</p> <p>V - VERY</p> <p>VST - VANE SHEAR TEST</p> <p>WEA. - WEATHERED</p> <p>W - UNIT WEIGHT</p> <p>W - DRY UNIT WEIGHT</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 PEICES 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>		<p>DRILL UNITS: MOBILE B-51, BK-51, CME-45C, CME-750, PORTABLE HOIST, CME-45B</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE 2 1/2" STEEL TEETH, TRICONE TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>	
TEXTURE OR GRAIN SIZE		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING	
<p>U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270</p> <p>BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE, SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)</p> <p>GRAIN SIZE: MM, IN</p>		<p>FRAC. SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p>		<p>TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p> <p>THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, < 0.008 FEET</p>		<p>ABBREVIATIONS: AR, BT, CL, CPT, CSE, DMT, DPT, F, FOSS., FRAC., FRAGS., HI., MED., MICA., MOD., NP, ORG., PMT, SAP., SD., SL., SLI., TCR, W, V, VST, WEA., W, W</p>	
SOIL MOISTURE - CORRELATION OF TERMS		FRACTURE SPACING		BEDDING		INDURATION	
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT</p> <p>- SATURATED - (SAT), - WET - (W), - MOIST - (M), - DRY - (D)</p>		<p>FRAC. SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p>		<p>TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p> <p>THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, < 0.008 FEET</p>		<p>INDURATION: FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>	
PLASTICITY		FRACTURE SPACING		BEDDING		INDURATION	
<p>NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY</p> <p>PLASTICITY INDEX (PI), DRY STRENGTH</p>		<p>FRAC. SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p>		<p>TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p> <p>THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, < 0.008 FEET</p>		<p>INDURATION: FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>	
COLOR		FRACTURE SPACING		BEDDING		INDURATION	
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>		<p>FRAC. SPACING: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET</p>		<p>TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p> <p>THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, < 0.008 FEET</p>		<p>INDURATION: FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>	



PROJECT REFERENCE NO.	SHEET
B-4463	3

SITE PLAN

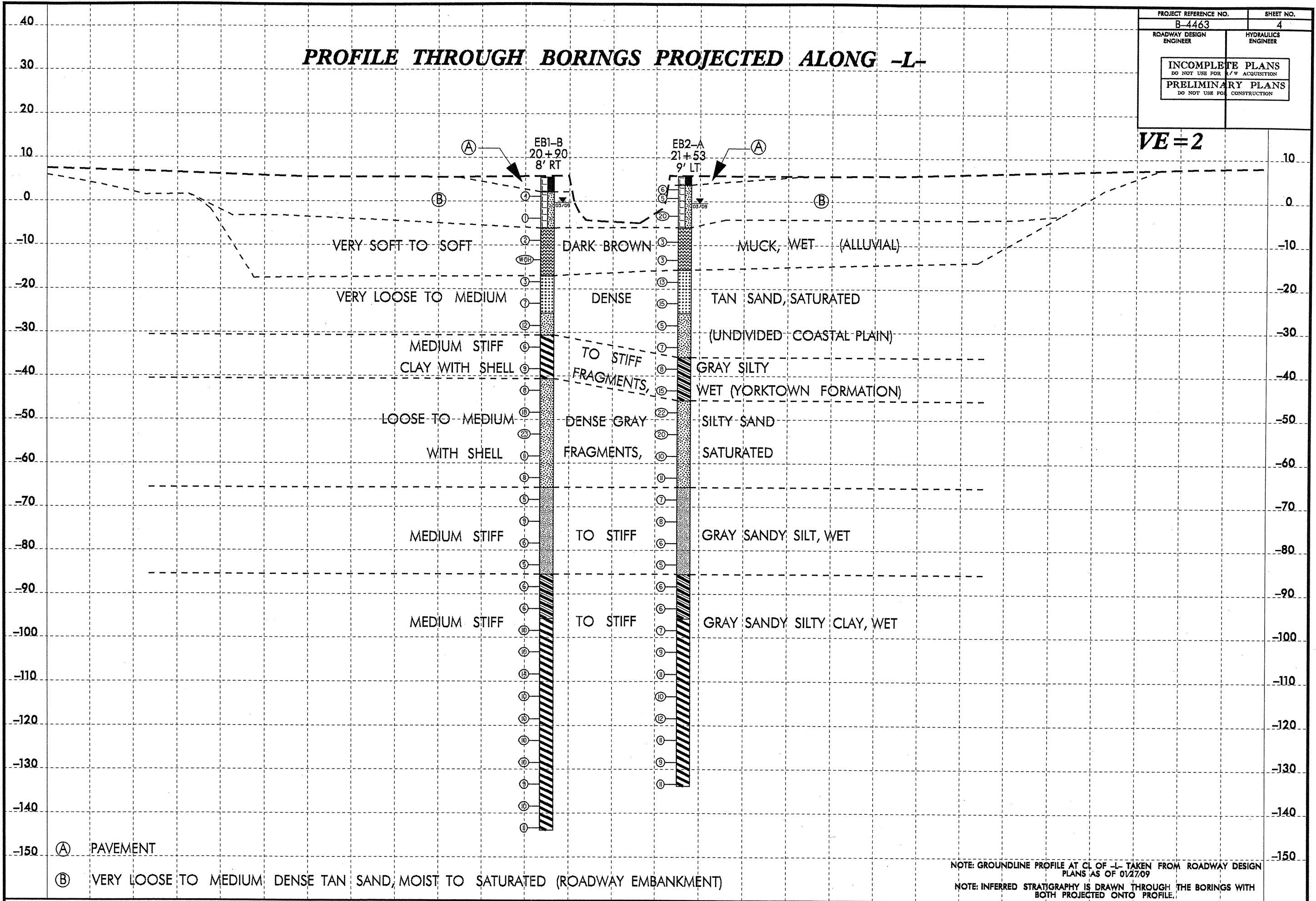
SKEW = 100°



HIGH WATER ELEV = 5'
HURRICANE "FLOYD" 1999
INFO PROVIDED FROM:
MR. GUY WILLIAMS
RT 2 EDENTON, NC 27932

PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2



NOTE: GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/27/09
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

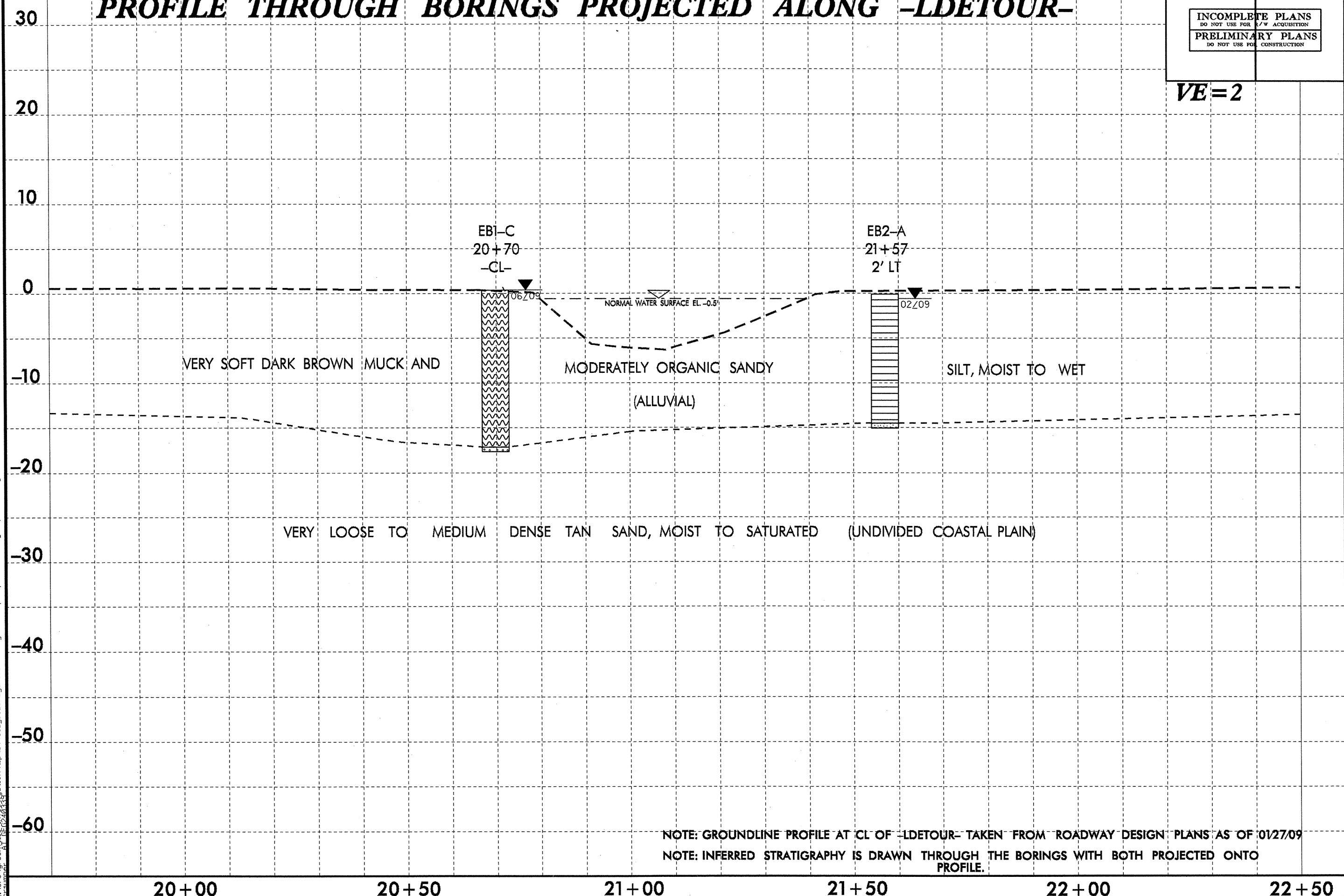
5/14/99

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PROJECT REFERENCE NO. B-4463	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

VE=2

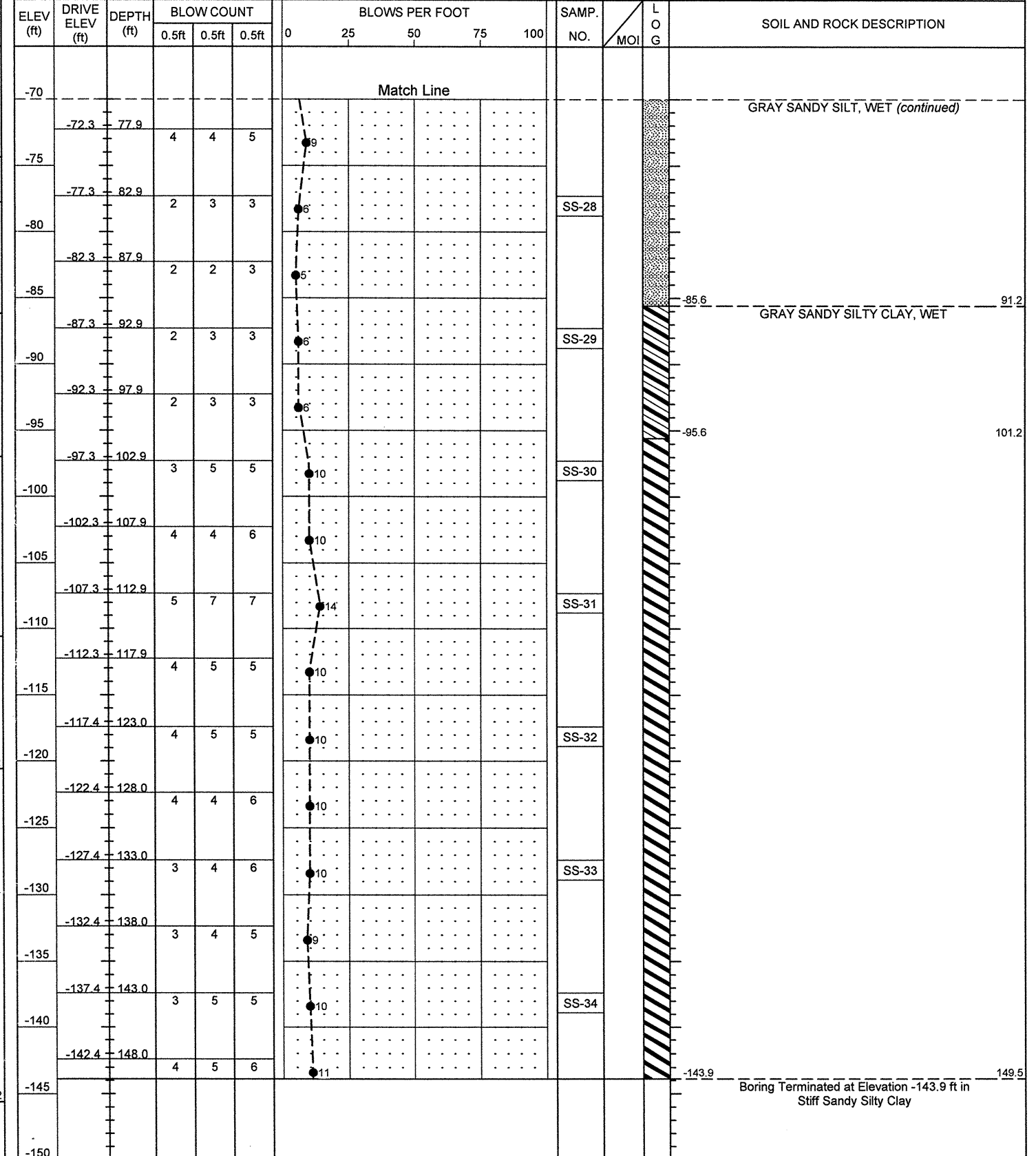
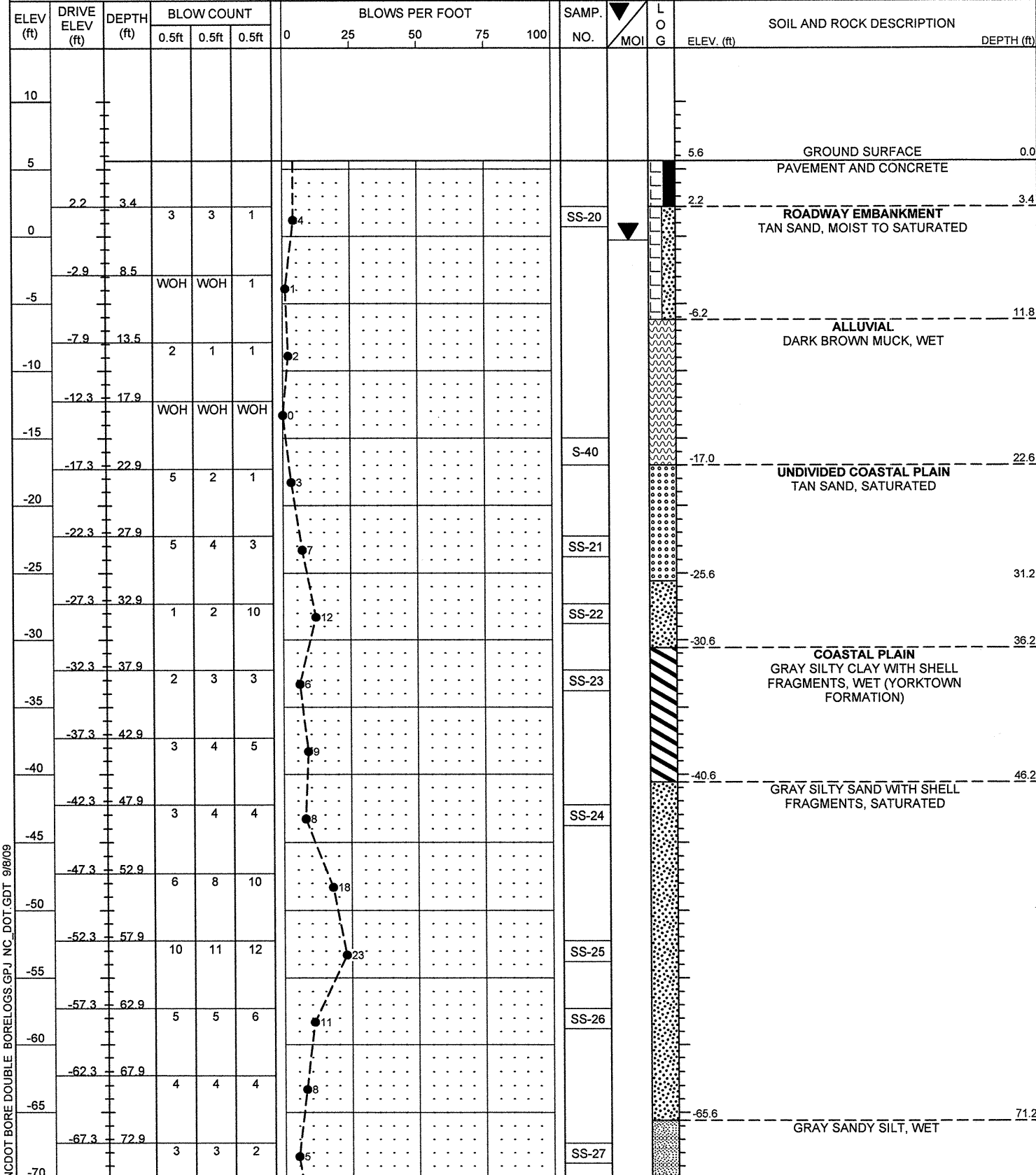
PROFILE THROUGH BORINGS PROJECTED ALONG -LDETOUR-



NOTE: GROUNDLINE PROFILE AT CL OF -LDETOUR- TAKEN FROM ROADWAY DESIGN PLANS AS OF 01/27/09
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -L- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 20+90	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.6 ft	TOTAL DEPTH 149.5 ft	NORTHING 849,207	EASTING 2,713,768
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/10/09	COMP. DATE 03/11/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -L- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 20+90	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.6 ft	TOTAL DEPTH 149.5 ft	NORTHING 849,207	EASTING 2,713,768
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/10/09	COMP. DATE 03/11/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

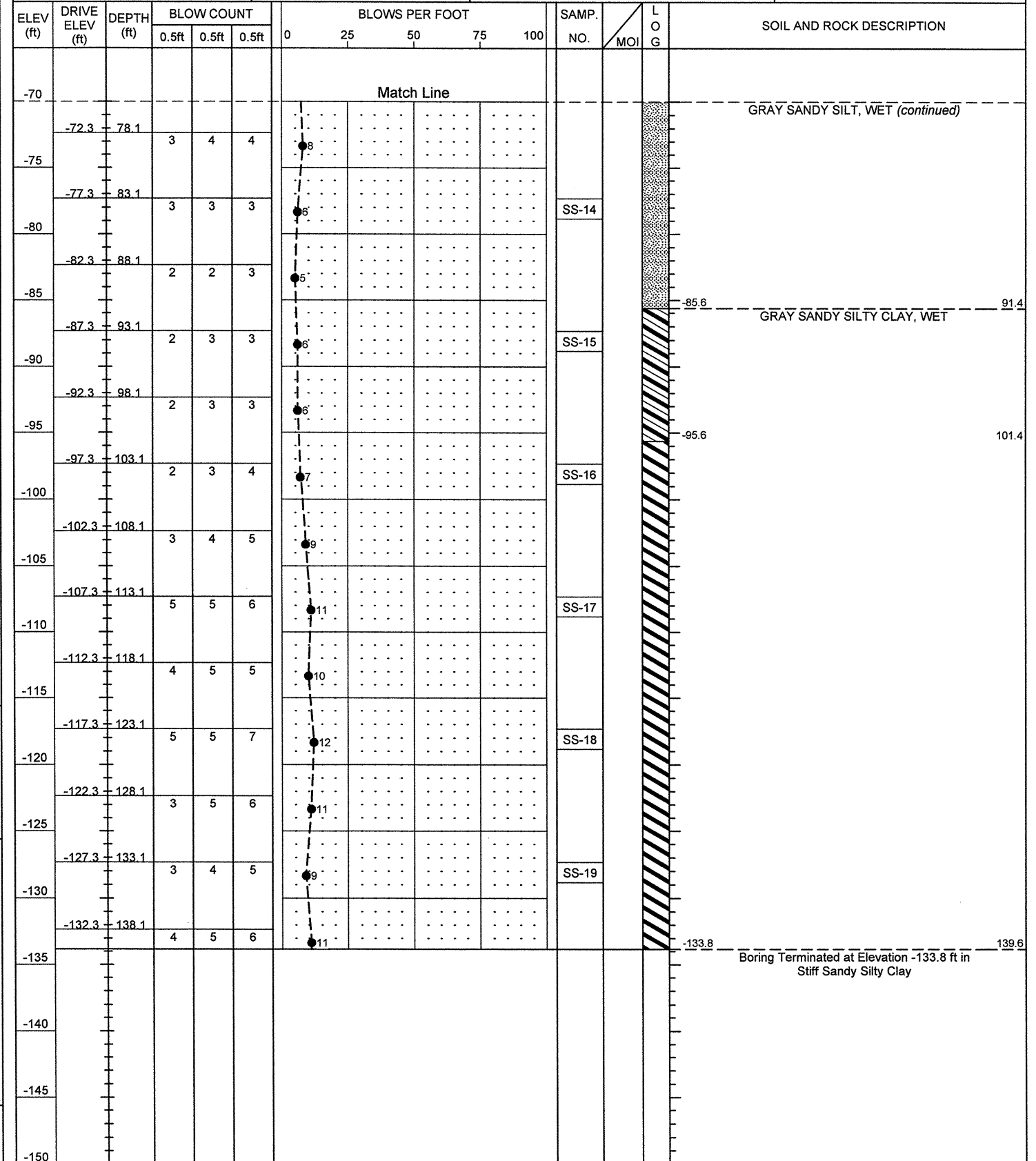
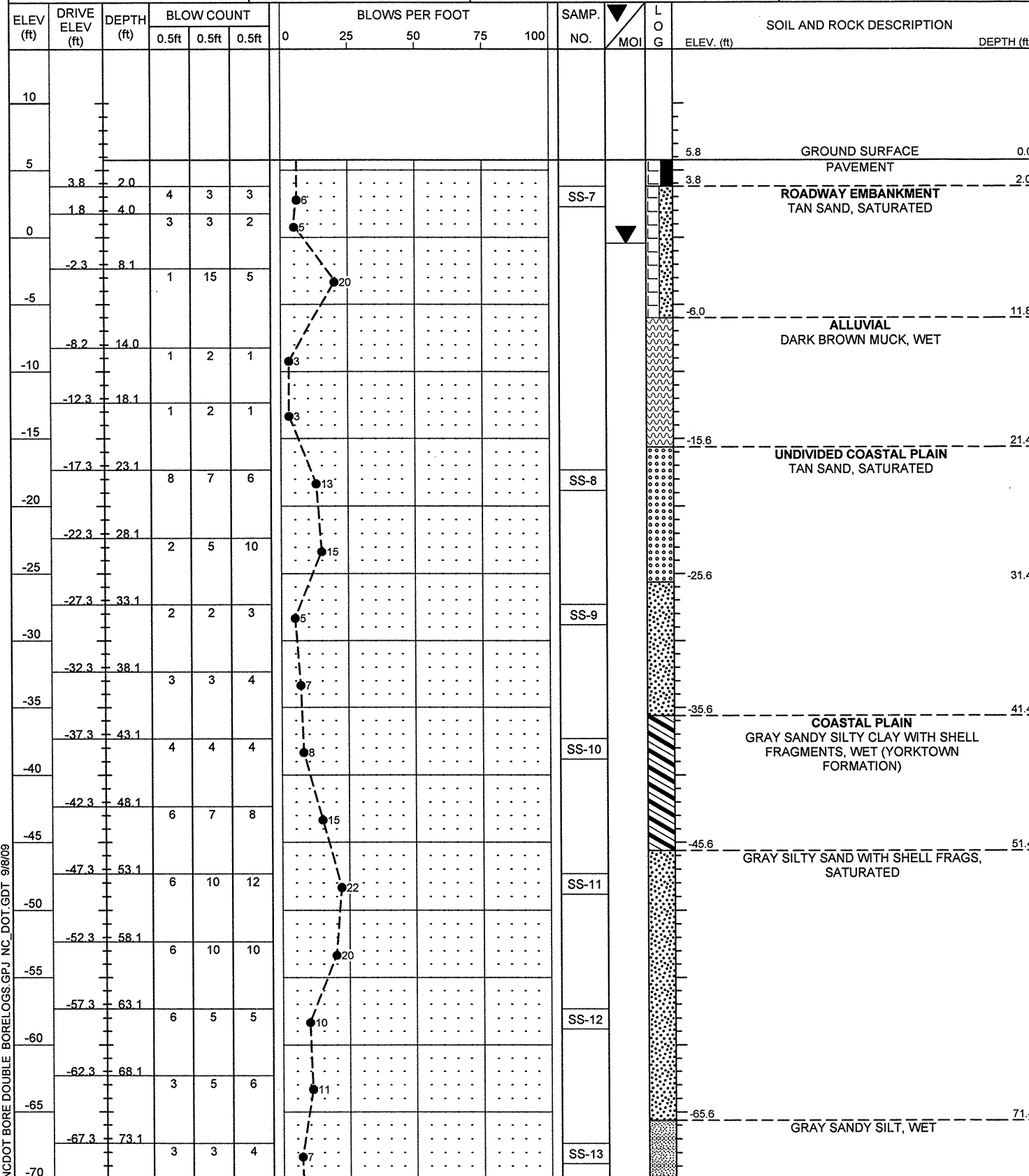


NC DOT BORE DOUBLE BORELOGS.GPJ NC_DOT_GDT 9/8/09

Boring Terminated at Elevation -143.9 ft in Stiff Sandy Silty Clay

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -L- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 21+53	OFFSET 9ft LT	ALIGNMENT -L-
COLLAR ELEV. 5.8 ft	TOTAL DEPTH 139.6 ft	NORTHING 849,201	EASTING 2,713,833
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/05/09	COMP. DATE 03/06/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -L- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 21+53	OFFSET 9ft LT	ALIGNMENT -L-
COLLAR ELEV. 5.8 ft	TOTAL DEPTH 139.6 ft	NORTHING 849,201	EASTING 2,713,833
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/05/09	COMP. DATE 03/06/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE BORELOGS.GPJ NC_DOT.GDT 9/8/09

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -LDETOUR- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB1-C	STATION 20+70	OFFSET CL	ALIGNMENT -LDETOUR-
COLLAR ELEV. 0.4 ft	TOTAL DEPTH 18.0 ft	NORTHING 849,167	EASTING 2,713,727
DRILL MACHINE N/A	DRILL METHOD Hand Auger	HAMMER TYPE N/A	
START DATE 06/25/09	COMP. DATE 06/25/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	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				
5													
0												GROUND SURFACE	0.0
-5												ALLUVIAL BROWN MUCK, MOIST TO WET	
-10													
-15													
-17.1												UNDIVIDED COASTAL PLAIN TAN SAND, SATURATED	17.5
-17.6												Boring Terminated at Elevation -17.6 ft in Loose Sand	-18.0
-20													
-25													
-30													
-35													
-40													
-45													
-50													
-55													
-60													
-65													
-70													
-75													

PROJECT NO. 33713.1.2	ID. B-4463	COUNTY Chowan	GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 12 ON -LDETOUR- (NC 32) OVER QUEEN ANNE CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 21+57	OFFSET 2ft LT	ALIGNMENT -LDETOUR-
COLLAR ELEV. -0.3 ft	TOTAL DEPTH 15.0 ft	NORTHING 849,138	EASTING 2,713,809
DRILL MACHINE N/A	DRILL METHOD Hand Auger	HAMMER TYPE N/A	
START DATE 02/17/09	COMP. DATE 02/17/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	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				
5													
0												GROUND SURFACE	0.0
-5										S-2		ALLUVIAL BROWN MODERATELY ORGANIC SANDY SILT, MOIST TO WET	
-10													
-15													
-14.8												UNDIVIDED COASTAL PLAIN TAN SAND, SATURATED	14.5
-15.3												Boring Terminated at Elevation -15.3 ft in Loose Sand	-15.0
-20													
-25													
-30													
-35													
-40													
-45													
-50													
-55													
-60													
-65													
-70													
-75													

NCDOT BORE DOUBLE BORELOGS.GPJ NC_DOT_GDT_9/8/09

B-4463

33713.1.2

BRIDGE NO. 12 OVER QUEEN ANNE CREEK AT -L- STA 21+24

SOIL TEST RESULTS EB1-B															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-20	8' RT	20+90	3.4-4.9	A-2-4(0)	19	1	20.0	54.6	9.3	16.1	100	94	30	-	-
S-40	8' RT	20+90	20.6-22.6	-	-	-	-	-	-	-	-	-	-	-	30.4
SS-21	8' RT	20+90	27.9-29.4	A-3(0)	23	NP	71.9	24.7	1.4	2.0	99	55	4	-	-
SS-22	8' RT	20+90	32.9-34.4	A-2-4(0)	21	2	17.8	55.0	13.0	14.1	98	93	28	-	-
SS-23	8' RT	20+90	37.9-39.4	A-7-6(20)	44	21	3.2	17.7	54.8	24.2	100	99	90	-	-
SS-24	8' RT	20+90	47.9-49.4	A-2-4(0)	26	9	35.3	35.2	13.4	16.1	80	67	25	-	-
SS-25	8' RT	20+90	57.9-59.4	A-2-4(0)	22	NP	13.1	75.4	5.4	6.0	89	86	12	-	-
SS-26	8' RT	20+90	62.9-64.4	A-2-4(0)	23	NP	3.9	74.0	10.0	12.1	100	99	24	-	-
SS-27	8' RT	20+90	72.9-74.4	A-4(0)	27	3	0.4	62.1	19.4	18.1	100	100	54	-	-
SS-28	8' RT	20+90	82.9-84.4	A-4(6)	34	9	0.4	49.0	30.4	20.2	100	100	75	-	-
SS-29	8' RT	20+90	92.9-94.4	A-6(9)	35	12	0.6	44.4	32.9	22.2	100	100	80	-	-
SS-30	8' RT	20+90	102.9-104.4	A-7-6(34)	54	31	0.2	13.5	52.0	34.3	100	100	97	-	-
SS-31	8' RT	20+90	112.9-114.4	A-7-6(27)	48	25	0.4	18.8	46.6	34.3	100	100	96	-	-
SS-32	8' RT	20+90	123.0-124.5	A-7-6(35)	54	32	0.2	11.1	54.4	34.3	100	100	98	-	-
SS-33	8' RT	20+90	133.0-134.5	A-7-6(34)	53	31	0.2	9.9	55.6	34.3	100	100	98	-	-
SS-34	8' RT	20+90	143.0-144.5	A-7-6(21)	41	20	0.4	16.1	55.2	28.2	100	100	97	-	-

SOIL TEST RESULTS EB2-A															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-7	9' LT	21+53	2.0-3.5	A-2-4(0)	21	3	8.7	61.7	11.3	18.2	100	97	35	-	-
SS-8	9' LT	21+53	23.1-24.6	A-3(0)	25	NP	15.5	81.3	2.2	1.0	100	99	5	-	-
SS-9	9' LT	21+53	33.1-34.6	A-2-4(0)	24	5	20.6	51.4	15.8	12.1	98	89	30	-	-
SS-10	9' LT	21+53	43.1-44.6	A-6(2)	33	17	40.9	20.9	22.1	16.2	91	71	36	-	-
SS-11	9' LT	21+53	53.1-54.6	A-2-4(0)	21	NP	48.6	35.0	8.3	8.1	79	59	14	-	-
SS-12	9' LT	21+53	63.1-64.6	A-2-4(0)	24	NP	5.5	77.3	7.1	10.1	99	97	19	-	-
SS-13	9' LT	21+53	73.1-74.6	A-4(0)	26	2	0.4	64.2	21.3	14.2	100	100	51	-	-
SS-14	9' LT	21+53	83.1-84.6	A-4(6)	32	9	0.2	49.8	31.8	18.2	100	100	77	-	-
SS-15	9' LT	21+53	93.1-94.6	A-6(10)	36	13	0.6	43.7	35.4	20.2	100	100	80	-	-
SS-16	9' LT	21+53	103.1-104.6	A-7-6(29)	52	27	0.4	19.6	47.6	32.4	100	100	94	-	-
SS-17	9' LT	21+53	113.1-114.6	A-7-6(28)	48	26	0.0	19.4	52.2	28.3	100	100	96	-	-
SS-18	9' LT	21+53	123.1-124.6	A-7-6(33)	52	30	0.4	10.7	56.7	32.3	100	100	98	-	-
SS-19	9' LT	21+53	133.1-134.6	A-7-6(36)	55	33	0.6	9.3	55.8	34.3	100	100	98	-	-

SOIL TEST RESULTS -LDETOUR- STA 21+52															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-2	2' LT	21+52	1.0-14.50	A-4(0)	41	9	22.4	28.8	28.1	20.7	100	86	52	41.5	17.3



FIELD SCOUR REPORT

WBS: 33713.1.2 TIP: B-4463 COUNTY: Chowan

DESCRIPTION(1): Bridge No. 12 on NC 32 over Queen Anne Creek at -L- Sta. 21+24

EXISTING BRIDGE

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

Bridge No.: 12 Length: 47' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Concrete and timber piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Erosion 1-2 feet at EB1 and EB2

Interior Bents: None noted

Channel Bed: None noted

Channel Bank: Erosion 2-3' on southeast bank

EXISTING SCOUR PROTECTION

Type(3): Abutment walls and wing walls

Extent(4): Under bridge and out 2-6 feet from ends of bridge

Effectiveness(5): Effective

Obstructions(6): None noted

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This

elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Muck

Channel Bank Material(8): Muck

Channel Bank Cover(9): Grass and shrubs

Floodplain Width(10): 500 feet

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

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Slight tendency to migrate south

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

EB1 EB2

-15.4	-15.4																		

Comparison of DSE to Hydraulics Unit theoretical scour:
 Geotechnical analysis agrees with Hydraulics Unit theoretical scour elevation.

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:
 Channel Bank: S-2
 S-40

Reported by: Dean Argenbright
 Dean Argenbright

Date: 3/10/2009