

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34531.1.1 (R-3324)	1	4

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34531.1.1 I.D. NO. R-3324  
COUNTY BRUNSWICK  
PROJECT DESCRIPTION NEW ROUTE FROM NC 133 (LONG BEACH RD.) TO NC 133 AND NC 87 (RIVER RD.) NORTH OF NC 133 ON NC 87 (GEORGE II RD.)  
SITE DESCRIPTION RETAINING WALL AT -L- STA. 22+50

**RETAINING WALL INVENTORY**

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN AND PROFILE
4	SAMPLE RESULTS

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

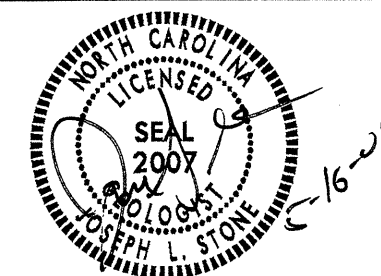
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

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

PERSONNEL

TCB  
RES  
HRC

INVESTIGATED BY JL STONE  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE MAY, 2008



**PROJECT: 34531.1.1 ID: R-3324**

DRAWN BY: JL STONE, CM 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.

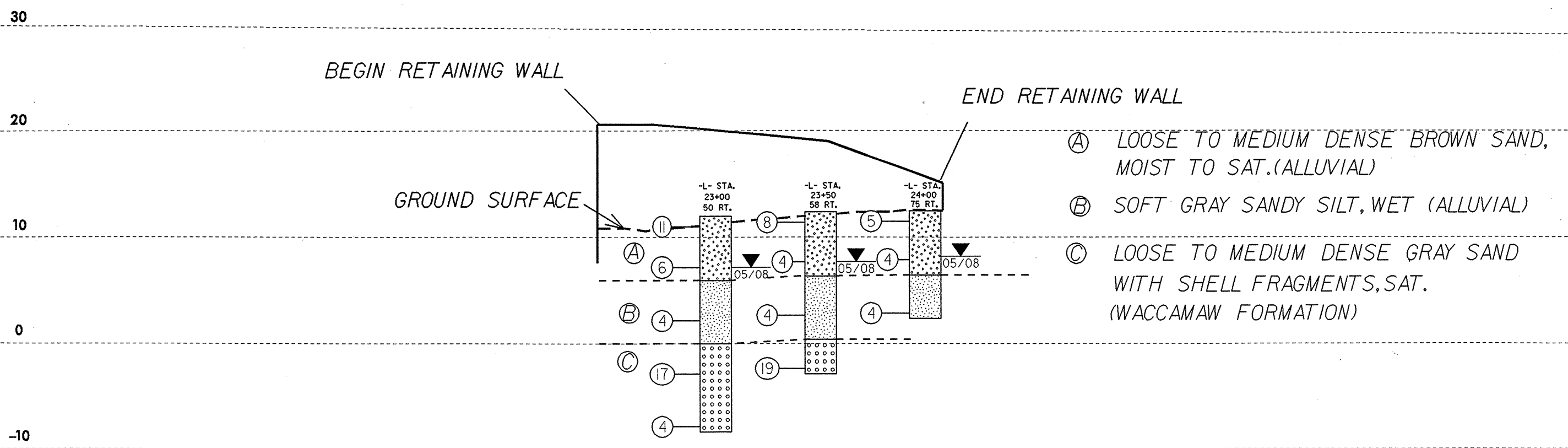
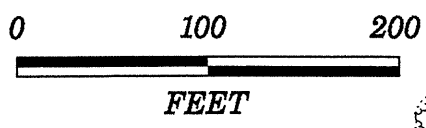
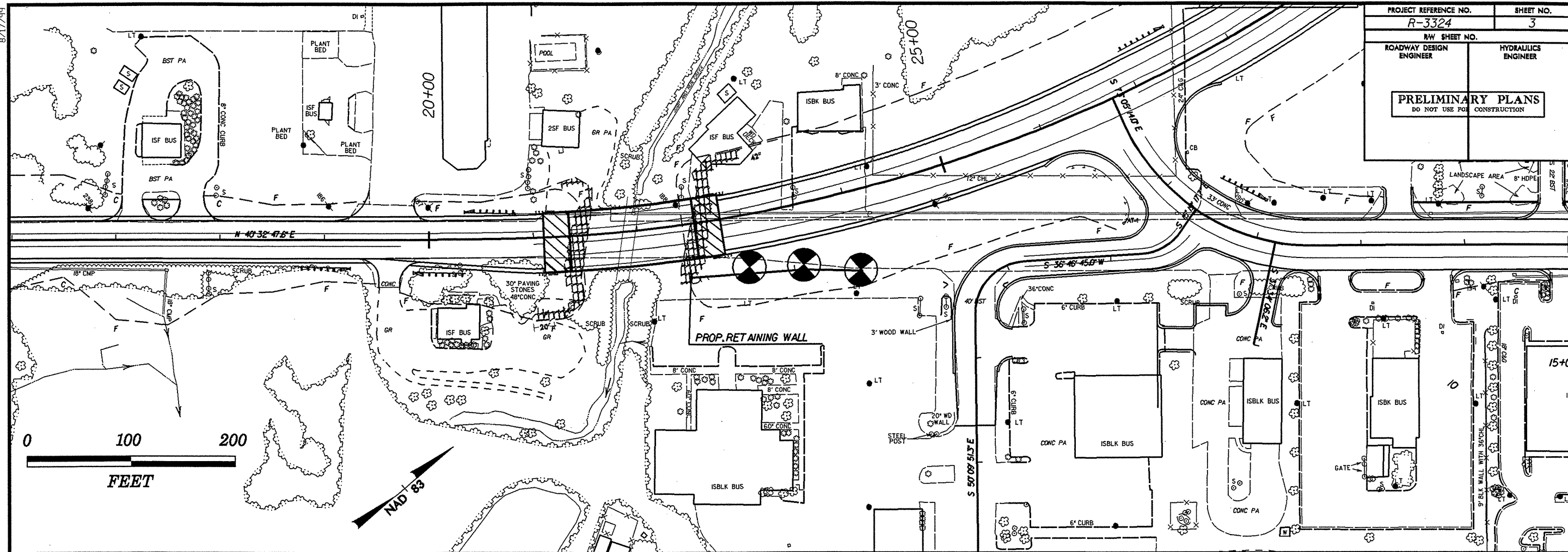
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

PROJECT REFERENCE NO.  
34531.II(R-3324) SHEET NO.  
2

**SUBSURFACE INVESTIGATION**

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

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																										
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLES:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>	<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p><b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;"><b>ANGULARITY OF GRAINS</b></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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p><b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.</p> <p><b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p><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.</p> <p><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.</p> <p><b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p><b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p><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.</p> <p><b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p><b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p><b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p><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.</p> <p><b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p><b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p><b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p><b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p><b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p><b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p><b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p><b>MOTTLED (MOT)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p><b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p><b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p><b>ROCK QUALITY DESIGNATION (RQD)</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.</p> <p><b>SAPROLITE (SAP)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p><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.</p> <p><b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p><b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p><b>STRATA CORE RECOVERY (SREC)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p><b>STRATA ROCK QUALITY DESIGNATION (SRQD)</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.</p> <p><b>TOPSOIL (TS)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																										
<p style="text-align: center;"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1-a</th> <th>A-1-b</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> </tr> </thead> <tbody> <tr> <td>SYMBOL</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td>○○○○○</td> <td></td> </tr> <tr> <td>% PASSING</td> <td>50 MX</td> <td>30 MX</td> <td>50 MX</td> <td>51 MN</td> <td>10 MX</td> <td>10 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td></td> </tr> <tr> <td>LIQUID LIMIT</td> <td>50 MX</td> <td>30 MX</td> <td>50 MX</td> <td>51 MN</td> <td>10 MX</td> <td>10 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td></td> </tr> <tr> <td>PLASTIC INDEX</td> <td>6 MX</td> <td>NP</td> <td>NP</td> <td>NP</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>16 MX</td> <td>16 MX</td> <td>16 MX</td> <td>16 MX</td> <td>16 MX</td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <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> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. 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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;"><b>COMPRESSIBILITY</b></p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31          MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50          HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;"><b>PERCENTAGE OF MATERIAL</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt;10%</td> <td>&gt;20%</td> <td>HIGHLY</td> </tr> </tbody> </table>		GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;"><b>WEATHERING</b></p> <p><b>FRESH</b> - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p><b>VERY SLIGHT (V SL.)</b> - 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><b>SLIGHT (SL.)</b> - 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><b>MODERATE (MOD.)</b> - 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><b>MODERATELY SEVERE (MOD. SEV.)</b> - 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></p> <p><b>SEVERE (SEV.)</b> - 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></p> <p><b>VERY SEVERE (V SEV.)</b> - 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></p> <p><b>COMPLETE</b> - 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><b>BENCH MARK:</b> BL-42 -L- STA. 91+85 1.06' RT</p> <p style="text-align: right;"><b>ELEVATION:</b> 30.37 FT.</p> <p>NOTES:</p>
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GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p><b>MODERATELY INDURATED</b> - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p><b>INDURATED</b> - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p><b>EXTREMELY INDURATED</b> - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																														
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- (A) LOOSE TO MEDIUM DENSE BROWN SAND, MOIST TO SAT.(ALLUVIAL)
- (B) SOFT GRAY SANDY SILT, WET (ALLUVIAL)
- (C) LOOSE TO MEDIUM DENSE GRAY SAND WITH SHELL FRAGMENTS, SAT. (WACCAMAW FORMATION)

23+00      23+50      24+00

VE=5

8/17/99  
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R-3324 RETAINING WALL AT -L- STA 22+50

HOLE #	SAMPLE #	RET 4	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
23+50	SS-1	-	100	94	18	26.2	68.8	5.8	5.2	21	NP	A-2-4(0)	1.00-1.50		
58 RT.	SS-2	-	100	91	8	14.8	78.4	1.6	5.2	18	NP	A-3(0)	13.70-15.20		



Area Geologist Transmittal Date: \_\_\_\_\_

PROJECT: 34531.1.1 TIP: R-3324 MMS TASK NO.: 23602  
 NETWORK: 11006299 FIELDWK ACT ELEM: 3960 CO: BRUNSWICK  
 DESCRIPTION: NEW ROUTE FROM NC 133 (LONG BEACH RD.) TO NC 133 AND  
NC 87 (RIVER RD.) NORTH ON NC 133 ON NC 87 (GEORGE II RD.)  
 FIELD OFFICE: Greenville FO PROJ. GEOLOGIST: JL STONE

PROJECT

Roadway Subsurface Investigation: For roadway subsurface investigations, complete the separate "Roadway Investigation Productivity Report"

Bridge Foundation Investigation: For bridge foundation investigations, complete the separate "Bridge Investigation Productivity Report"

Length of Wall, Culvert, or Pipe. (feet) 150 ft  
 For a wall, were wall length, drill footage and expenses also reported on the Roadway Investigation Productivity Report (Yes/No) no

High Mount Light Tower Foundation Investigation (each) \_\_\_\_\_

Vibration Claim (each) \_\_\_\_\_

Siltation Claim (each) \_\_\_\_\_

Water Well Claim (each) \_\_\_\_\_

Other \_\_\_\_\_ (Number of projects visited) \_\_\_\_\_

DRILL LENGTH

Total length of auger borings. (feet) \_\_\_\_\_

Total length of in-situ soil test borings (S.P.T., V.S.T., penetrometer test, etc.). (feet) 45.6 ft

Total length of core borings. (feet) \_\_\_\_\_

HOURS & EXPENSES


Total time (man-hours) for completion of project (total time charged against this project for completion of investigation). 39.4 hr

Total time (man-hours) for completion of office work on this project. 10.0 hr

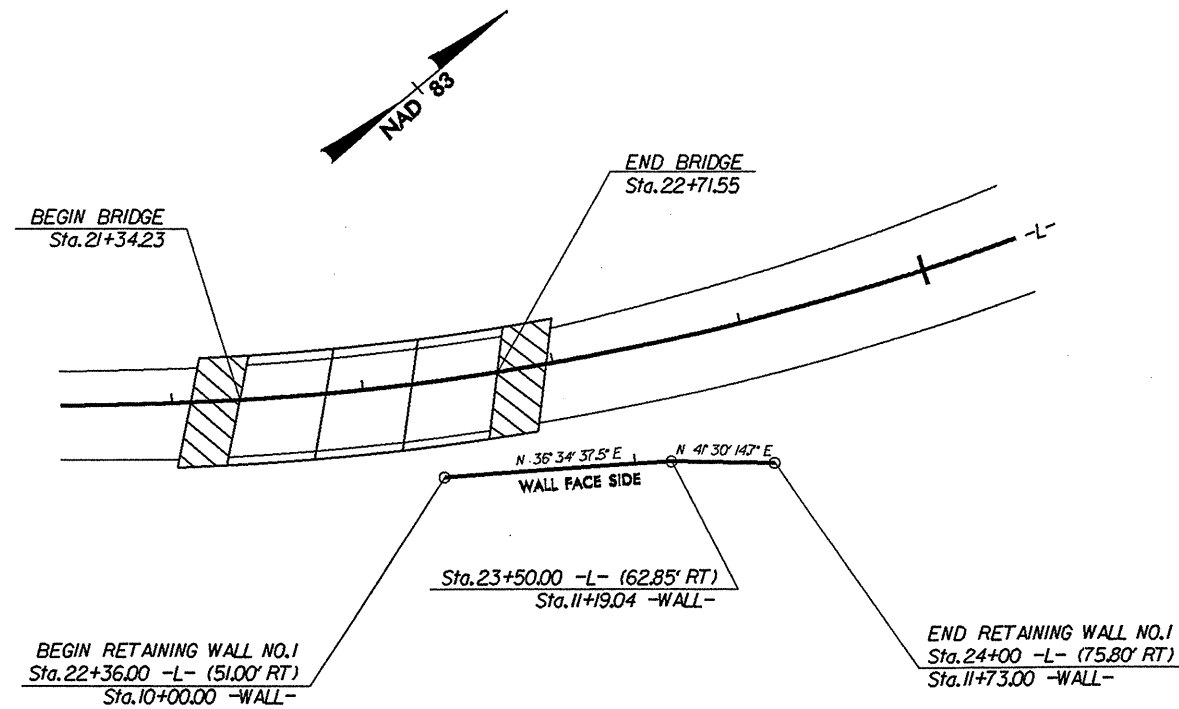
Total expenses (hotel, meals, and phone) for Project Geologist and Crew \_\_\_\_\_

GEOTECHNICAL ENGINEER

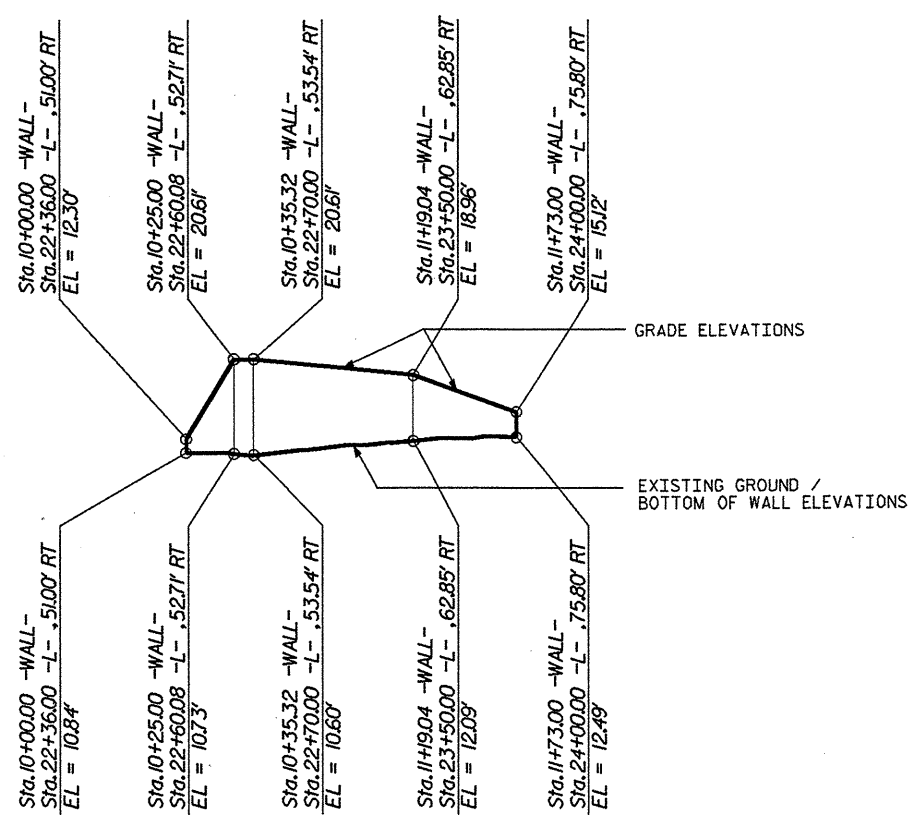
ENGINEER



SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_ SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_



MSE WALL NO. 1 - PLAN VIEW (NTS)



MSE WALL NO. 1 - EXPOSED WALL FACE ENVELOPE (NTS)

NOTES:

- FOR MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS, SEE MECHANICALLY STABILIZED EARTH RETAINING WALLS PROVISION.
- CAST-IN-PLACE REINFORCED CONCRETE COPING IS REQUIRED FOR RETAINING WALL NO. 1.
- A DRAIN IS REQUIRED FOR RETAINING WALL NO. 1.
- BEFORE BEGINNING MSE WALL DESIGN FOR RETAINING WALL NO. 1, SURVEY WALL LOCATION AND SUBMIT A REVISED WALL PROFILE VIEW (WALL ENVELOPE) FOR REVIEW. DO NOT START WALL DESIGN OR CONSTRUCTION UNTIL THE REVISED WALL ENVELOPE IS ACCEPTED.
- DESIGN RETAINING WALL NO. 1 FOR THE FOLLOWING:
  - 1) H = DESIGN HEIGHT + EMBEDMENT
  - 2) DESIGN LIFE = 75 YEARS
  - 3) MINIMUM REINFORCEMENT LENGTH (L) TO WALL HEIGHT (H) RATIO = 1.0
  - 4) AGGREGATE PARAMETERS:

AGGREGATE TYPE*	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
COARSE	110	38	0
FINE	125	34	0

\* SEE MSE RETAINING WALLS PROVISION FOR COARSE AND FINE AGGREGATE MATERIAL REQUIREMENTS.

5) IN-SITU ASSUMED MATERIAL PARAMETERS:

MATERIAL TYPE	UNIT WEIGHT (γ) LB/CF	FRICTION ANGLE (φ) DEGREES	COHESION (c) LB/SF
BACKFILL	120	30	0
FOUNDATION	120	30	0

DESIGN RETAINING WALL NO. 1 FOR A LIVE LOAD (TRAFFIC) SURCHARGE.

EXISTING OR FUTURE OBSTRUCTIONS SUCH AS FOUNDATIONS, GUARDRAIL, FENCE OR HANDRAIL POSTS, PAVEMENTS, PIPES, INLETS OR UTILITIES MAY INTERFERE WITH REINFORCEMENT FOR RETAINING WALL NO. 1.

DO NOT PLACE LEVELING PAD CONCRETE, AGGREGATE OR REINFORCEMENT FOR RETAINING WALL NO. 1 UNTIL EXCAVATION DIMENSIONS AND FOUNDATION MATERIAL ARE APPROVED.

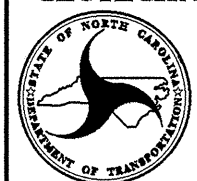
MSE WALL ESTIMATED QUANTITY (SQUARE FOOT)	
MSE RETAINING WALL NO. 1	1350 SF

PROJECT NO.: R-3324  
 BRUNSWICK COUNTY  
 STATION: 22+50.00 -L-  
 SHEET 1 OF 3

**GEOTECHNICAL ENGINEERING UNIT**


EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE

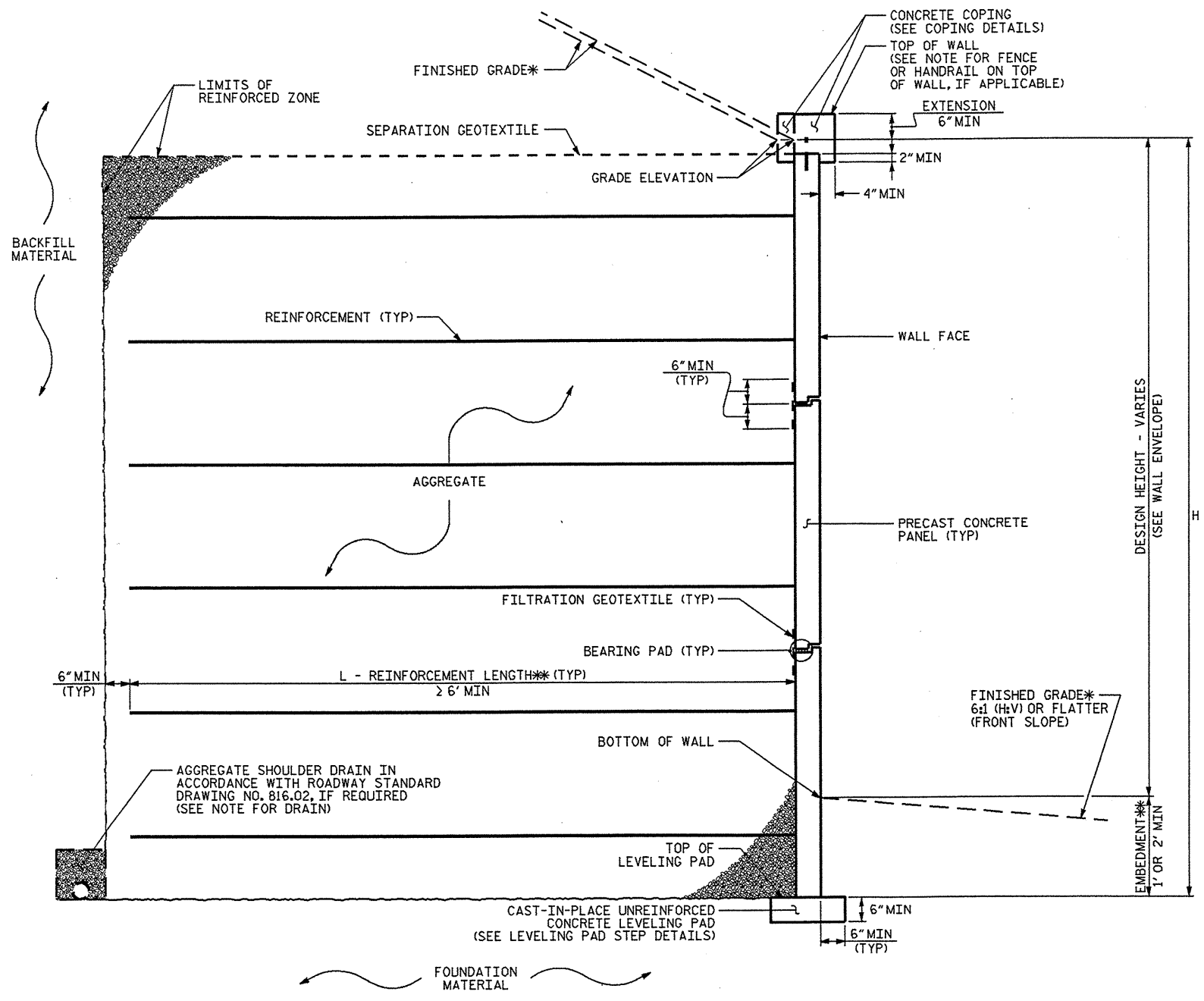
STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH



MSE WALL NO. 1  
 PLAN AND NOTES

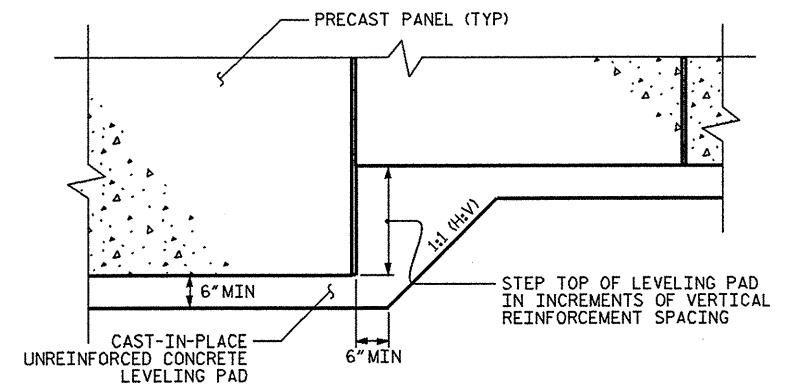
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NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1			3			
2			4			

GEOTECHNICAL ENGINEER  SIGNATURE _____ DATE _____		ENGINEER SIGNATURE _____ DATE _____	
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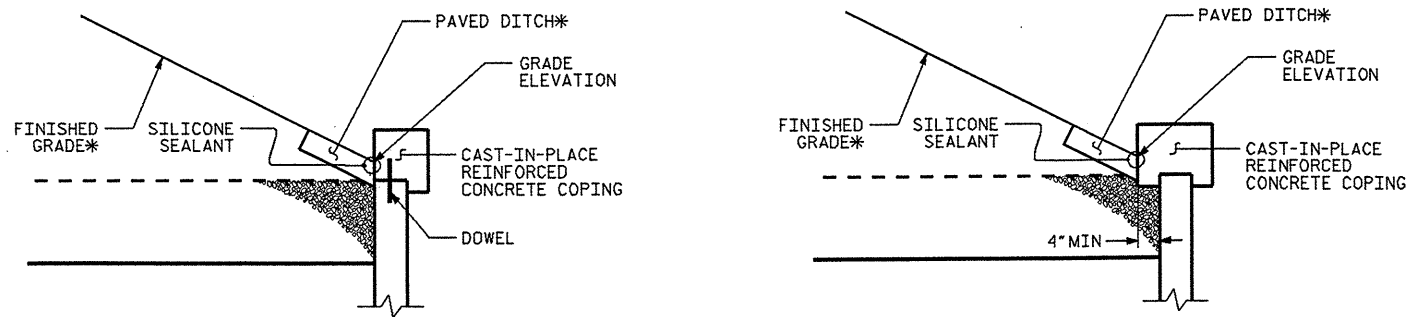


**MSE WALL WITH PRECAST PANELS - TYPICAL SECTION**

\*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.  
 \*\*SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



**PRECAST CONCRETE PANELS**  
**LEVELING PAD STEP DETAILS**



**COPING DETAILS**

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO PANELS WITH DOWELS OR EXTEND COPING DOWN BACK OF PANELS.  
 \*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.

**PROJECT NO.:** R-3324  
**BRUNSWICK COUNTY**  
**STATION:** 22+50.00 -L-  
 SHEET 2 OF 3

**GEOTECHNICAL ENGINEERING UNIT**  
 EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE  
**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**RALEIGH**

**MSE WALL NO. 1**  
**DETAILS WITH**  
**PRECAST CONCRETE PANELS**

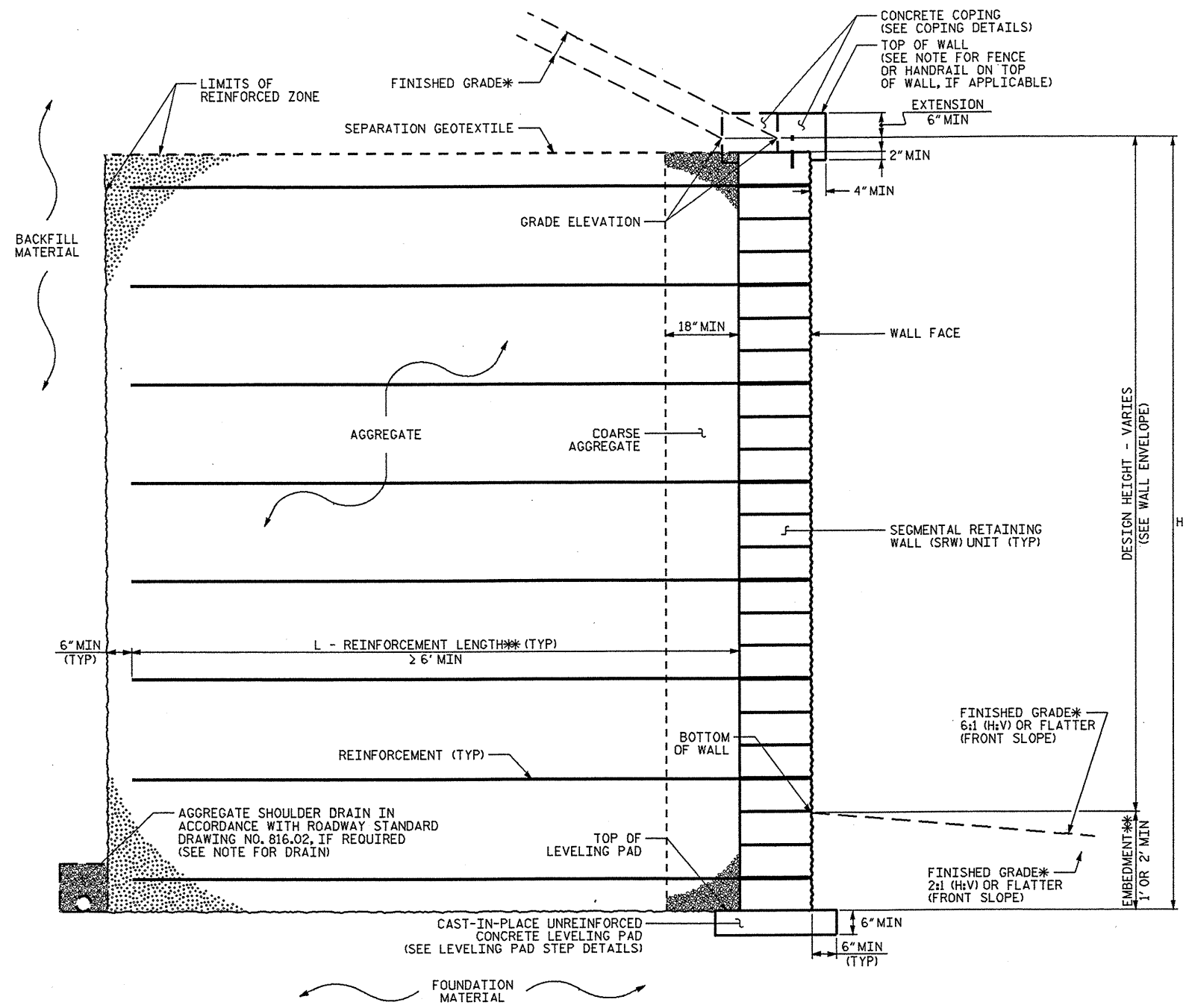
REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1	-	-	3	-	-	-
2	-	-	4	-	-	-

PREPARED BY: J. PARK      DATE: 08/2012  
 REVIEWED BY: J. BATTS      DATE: 08/2012

GEOTECHNICAL ENGINEER  
 ENGINEER

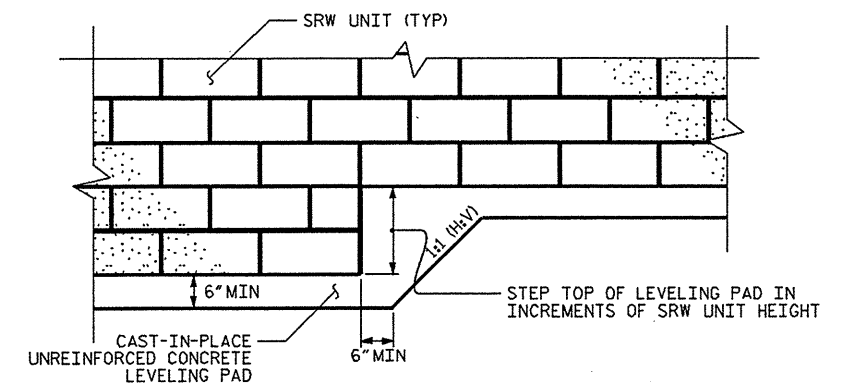
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 JUYOUNG PARK

SIGNATURE DATE SIGNATURE DATE



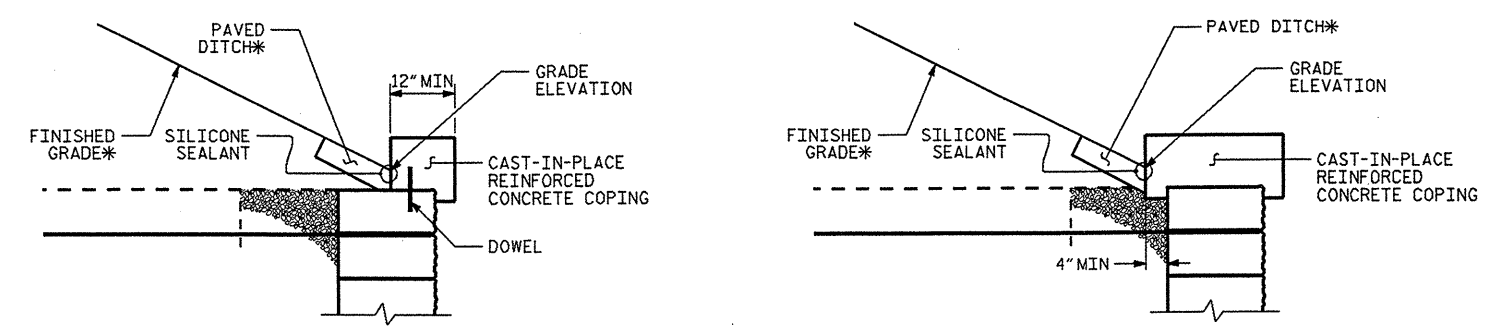
**MSE WALL WITH SRW UNITS - TYPICAL SECTION**

\*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.  
 \*\*SEE MSE RETAINING WALLS PROVISION FOR EMBEDMENT AND REINFORCEMENT LENGTH REQUIREMENTS.



**SEGMENTAL RETAINING WALL (SRW) UNITS**

**LEVELING PAD STEP DETAILS**



**COPING DETAILS**

AT THE CONTRACTOR'S OPTION, CONNECT COPING TO SRW UNITS WITH DOWELS OR EXTEND COPING DOWN BACK OF SRW UNITS.  
 \*SEE ROADWAY PLANS FOR FINISHED GRADE AND DITCH DETAILS.

PROJECT NO.: R-3324  
 BRUNSWICK COUNTY  
 STATION: 22+50.00 -L-  
 SHEET 3 OF 3

**GEOTECHNICAL ENGINEERING UNIT**

EASTERN REGIONAL OFFICE  
 WESTERN REGIONAL OFFICE  
 CONTRACT OFFICE

STATE OF NORTH CAROLINA  
 DEPARTMENT OF TRANSPORTATION  
 RALEIGH

**MSE WALL NO. 1  
 DETAILS WITH  
 SRW UNITS**

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	TOTAL SHEETS
1			3			
2			4			

PREPARED BY: J. PARK DATE: 08/2012  
 REVIEWED BY: J. BATTS DATE: 05/2012



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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34531.1.1 I.D. NO. R-3324  
 COUNTY BRUNSWICK  
 PROJECT DESCRIPTION NEW ROUTE FROM NC 133 (LONG BEACH RD.) TO NC 133 AND NC 87 (RIVER RD.) NORTH OF NC 133 ON NC 87 (GEORGE II RD.)  
 SITE DESCRIPTION BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK AT -L- STA. 87+04.5

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOG(S)
7-8	SOIL TEST RESULTS
9	SCOUR REPORT

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

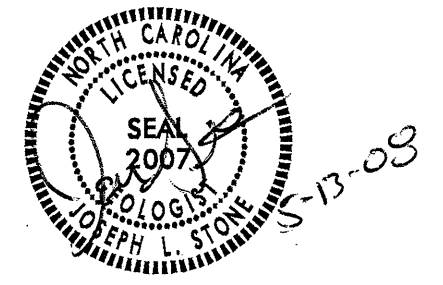
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

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

**PROJECT: 34531.1.1 ID: R-3324**

PERSONNEL  
J.R. SWARTLEY  
T.C. BOTTOMS  
MACTEC PERSONNEL

INVESTIGATED BY JL STONE  
 CHECKED BY D.N. ARGENBRIGHT  
 SUBMITTED BY D.N. ARGENBRIGHT  
 DATE MAY, 2008



DRAWN BY: JL STONE

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.

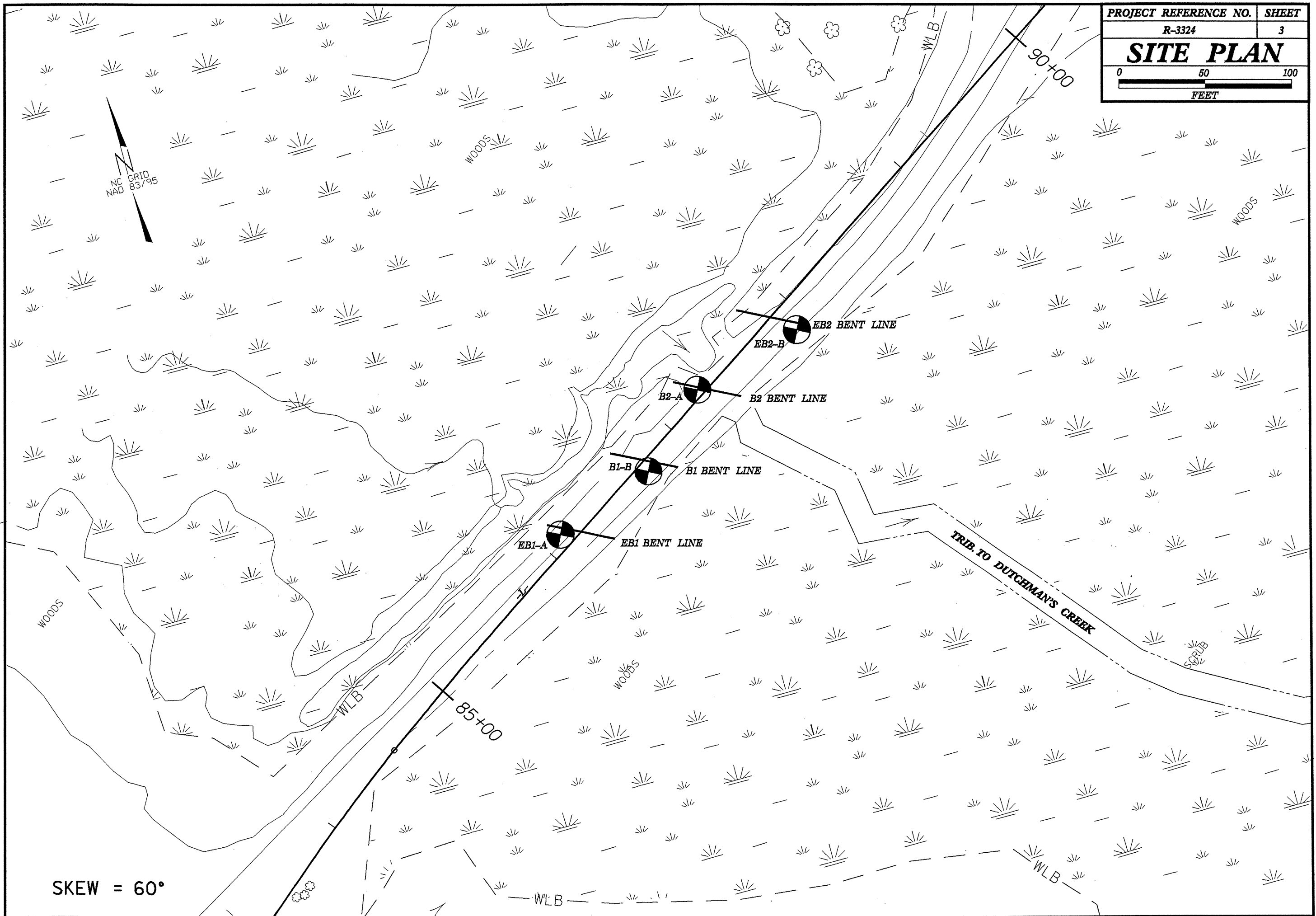
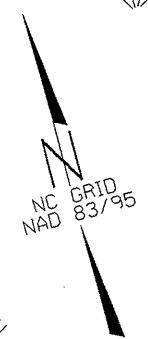
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT

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: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6			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 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:			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 DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FMJ) - 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 (ROD) - 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 INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>			<b>MINERALOGICAL COMPOSITION</b>			<b>WEATHERING</b>			<b>WEATHERING</b>					
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS			MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.			WEATHERED ROCK (WR)			NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.					
<b>COMPRESSION</b>			<b>PERCENTAGE OF MATERIAL</b>			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.					
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE			LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50			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 PHYLLITE, SLATE, SANDSTONE, ETC.					
<b>TEXTURE OR GRAIN SIZE</b>			<b>GROUND WATER</b>			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.					
U.S. STD. SIEVE SIZE OPENING (MM)			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			FRESH			ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.					
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GRV.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)			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			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.					
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>			<b>MISCELLANEOUS SYMBOLS</b>			SEVERE (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.					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			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, FRACTURES FRAGS. - FRAGMENTS			VERY SEVERE (V 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.					
<b>PLASTICITY</b>			<b>ABBREVIATIONS</b>			COMPLETE			ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIXES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.					
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY			HI. - HIGHLY MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLL - SLIGHTLY TCR - TRICONE REFUSAL			VERY HARD			CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.					
<b>COLOR</b>			<b>EQUIPMENT USED ON SUBJECT PROJECT</b>			ROCK HARDNESS			HARD					
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.			DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> DIEDRICH D-50			ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/8" * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT			VERY HARD			SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.		
<b>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</b>			<input type="checkbox"/> HAMMER TYPE: <input type="checkbox"/> AUTOMATIC <input checked="" type="checkbox"/> MANUAL <input type="checkbox"/> CORE SIZE: <input type="checkbox"/> B- <input type="checkbox"/> N- <input type="checkbox"/> H- <input type="checkbox"/> HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST			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.					
<b>PLASTICITY INDEX (PI)</b>			<b>FRACTURE SPACING</b>			MEDIUM HARD			CAN BE GROVED 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.					
DRY STRENGTH			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			VERY SOFT			CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.					
<b>INDURATION</b>			<b>BEDDING</b>			SOFT			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					
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			FRIABLE			MODERATELY INDURATED			RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
MODERATELY INDURATED			INDURATED			EXTREMELY INDURATED			GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					

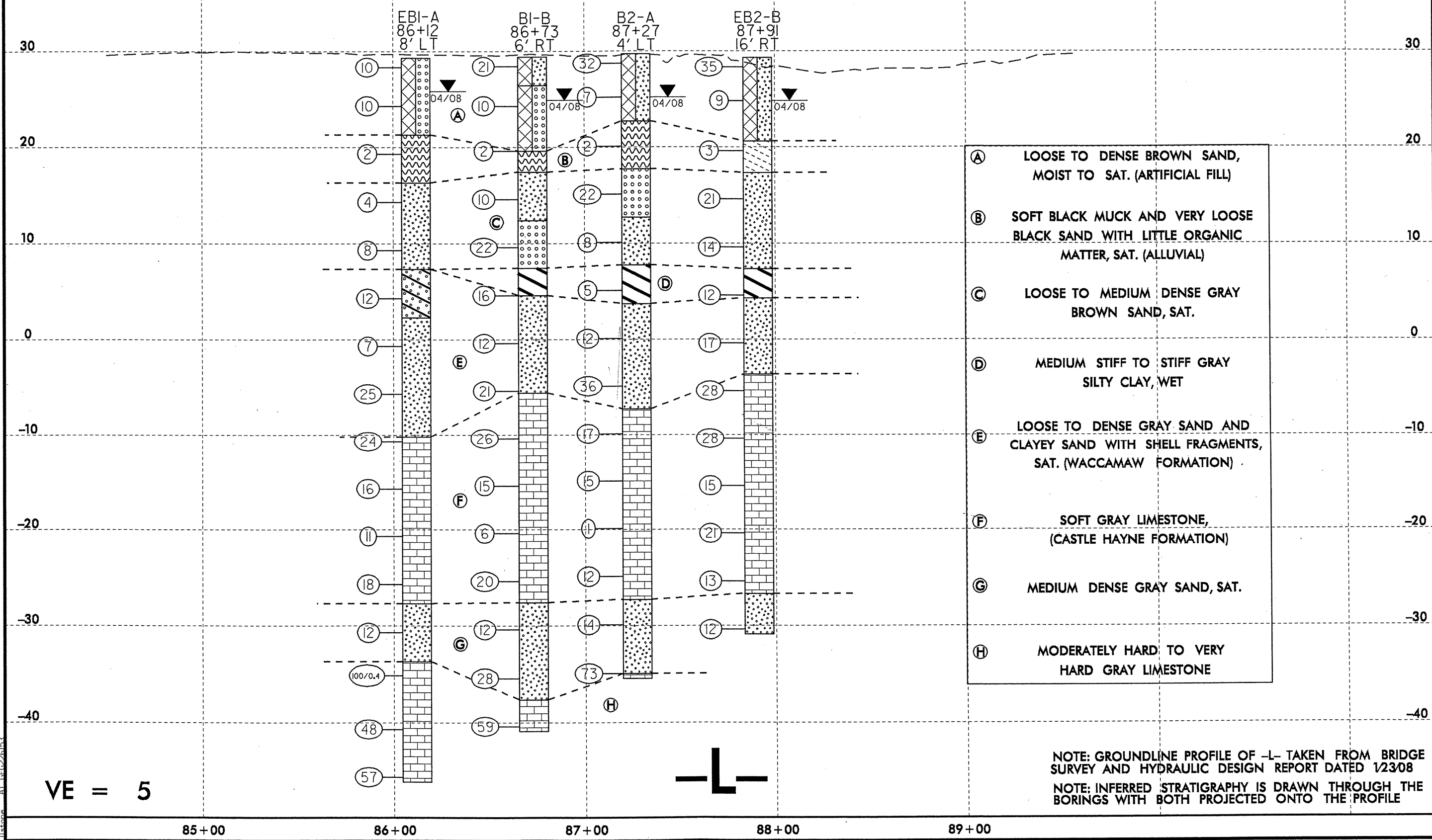


SKEW = 60°

5/14/99

PROJECT REFERENCE NO. R-3324	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

# PROFILE THROUGH BORINGS PROJECTED ALONG -L-



VE = 5

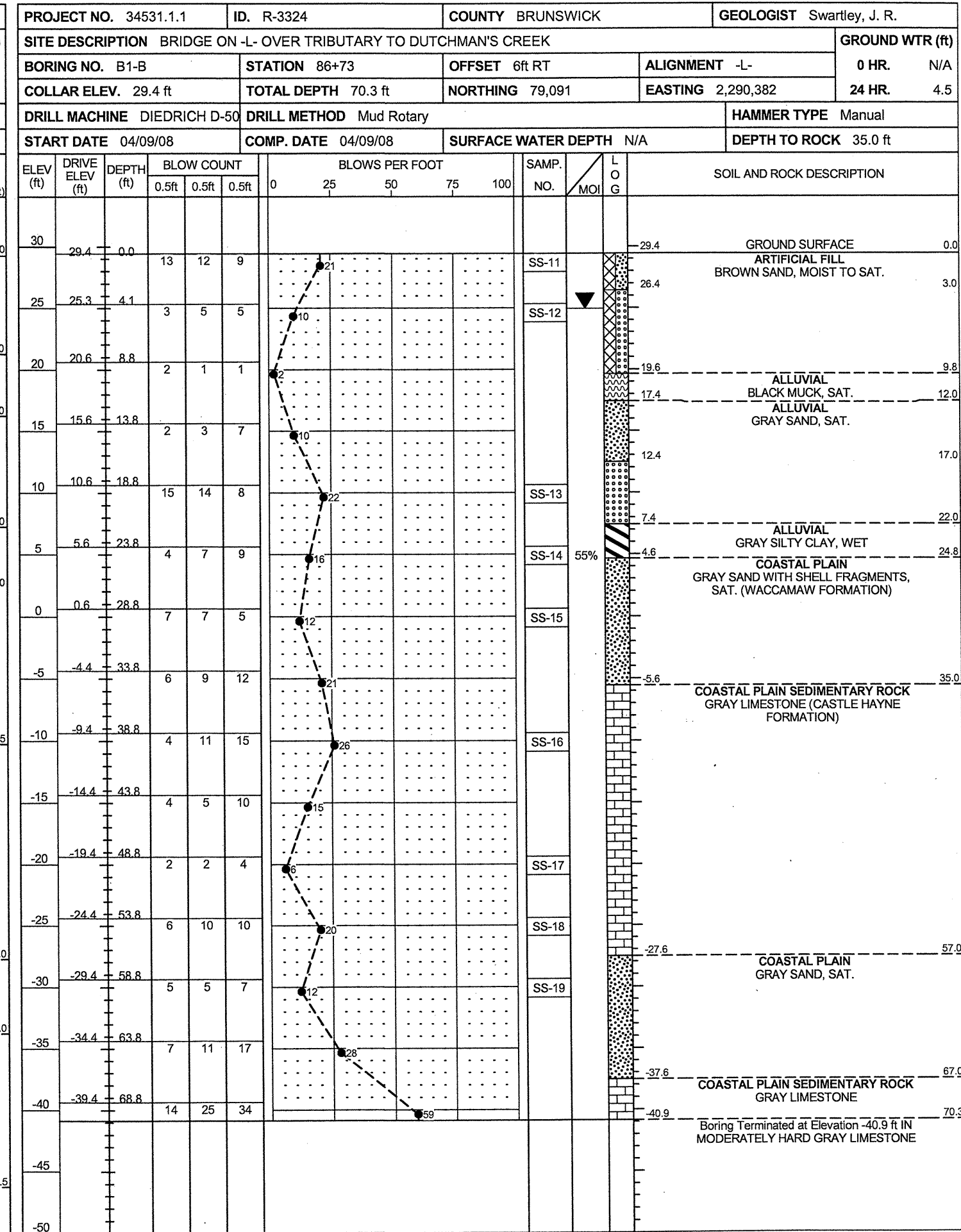
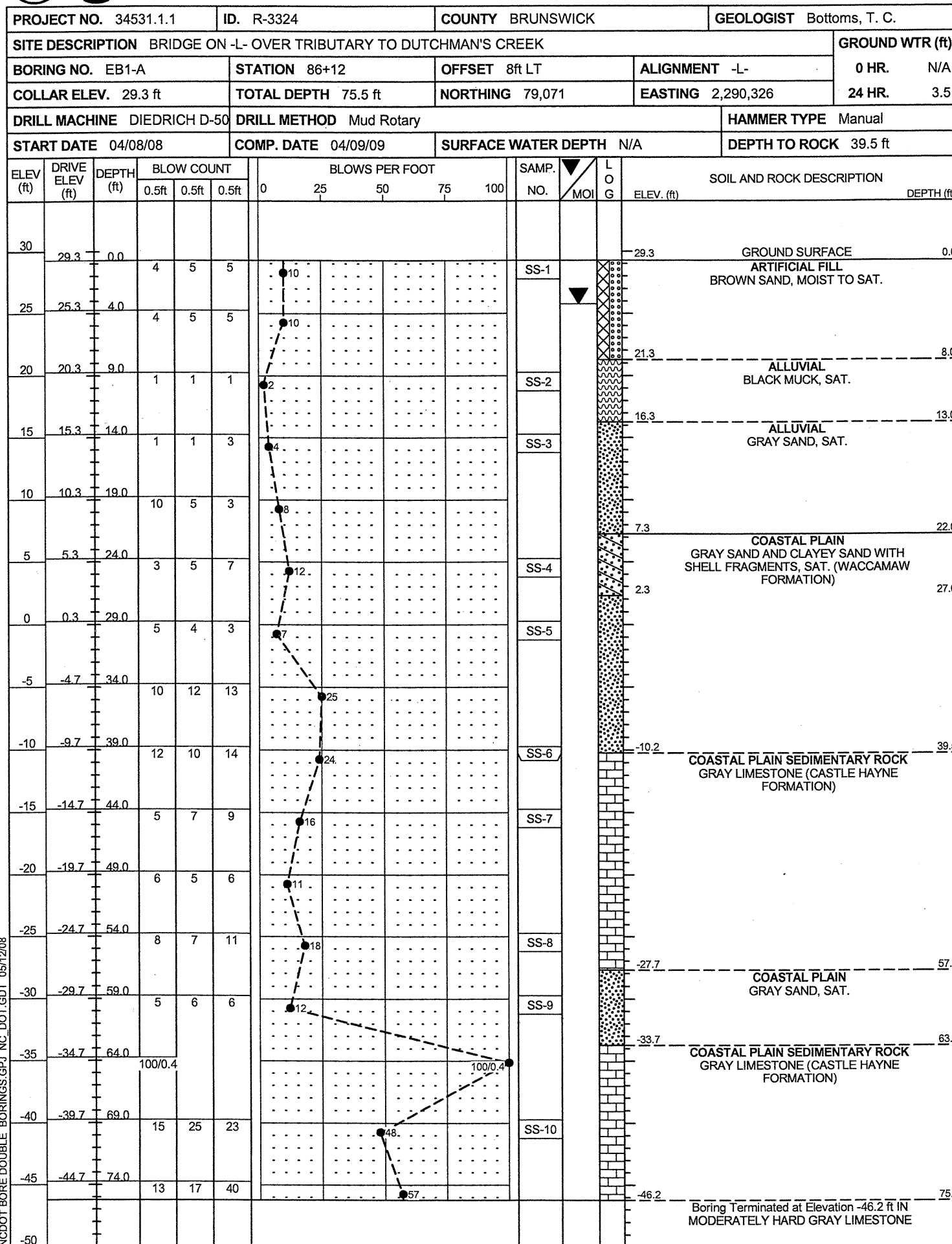
NOTE: GROUNDLINE PROFILE OF -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 1/23/08  
 NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

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# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT



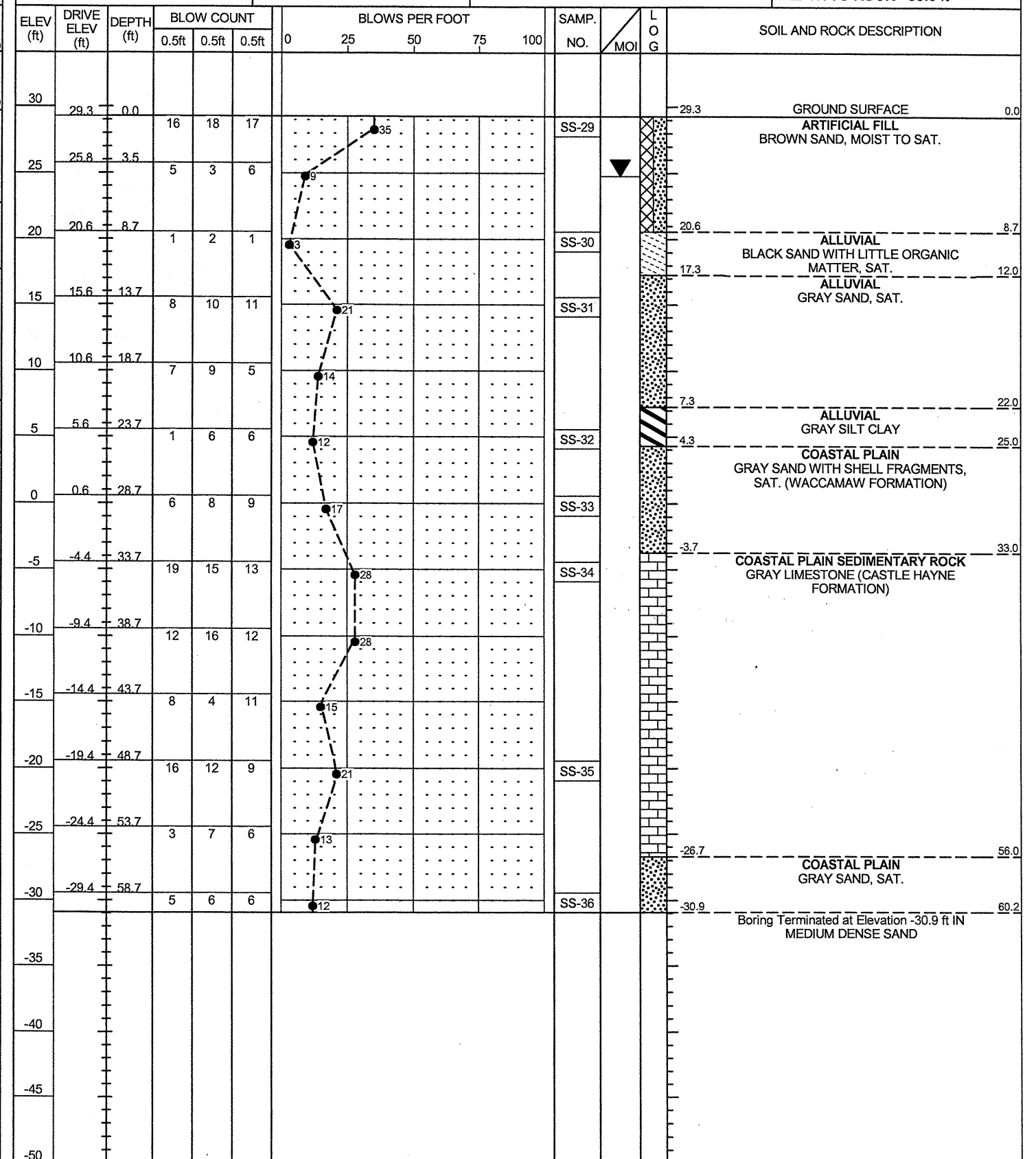
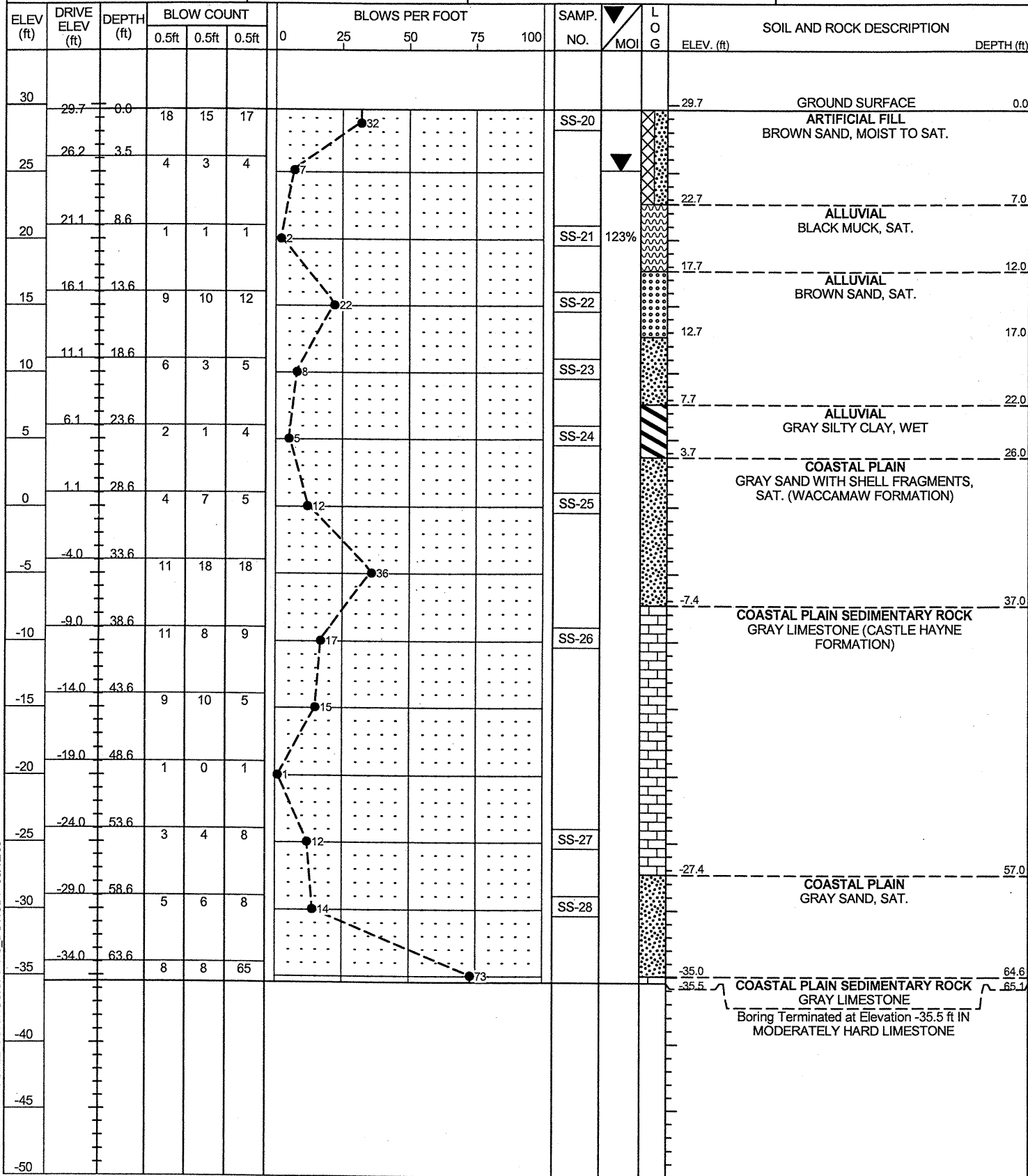
NCDOT BORE DOUBLE BORINGS.GPJ NC\_DOT\_GDT\_05/12/08



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK			GROUND WTR (ft)
BORING NO. B2-A	STATION 87+27	OFFSET 4ft LT	ALIGNMENT -L-
COLLAR ELEV. 29.7 ft	TOTAL DEPTH 65.1 ft	NORTHING 79,120	EASTING 2,290,423
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/10/08	COMP. DATE 04/10/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 37.0 ft

PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 87+91	OFFSET 16ft RT	ALIGNMENT -L-
COLLAR ELEV. 29.3 ft	TOTAL DEPTH 60.2 ft	NORTHING 79,147	EASTING 2,290,487
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 04/10/08	COMP. DATE 04/10/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 33.0 ft



NCDOT BORE DOUBLE BORINGS.GPJ NC\_DOT.GDT 05/12/08

## BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	ORG.	MOI.
EB1-A	SS-1	100	96	6	46.6	47.4	3	3	19	NP	A-3(0)	1.00-1.50	15.0	
	SS-2	97	90	24	25.7	50.9	19.4	4	56	NP	A-2-5(0)	9.00-10.50		
	SS-3	100	95	6	18.4	76.9	2.7	2	27	NP	A-2-5(0)	14.00-15.50		
	SS-4	79	55	25	45.5	24.2	12.1	18.2	28	15	A-2-6(1)	24.00-25.50		
	SS-5	100	97	14	11.1	77.9	4.9	6.1	31	NP	A-2-4(0)	29.00-30.50		
	SS-6	88	54	12	64.4	24.2	4.2	7.1	20	NP	A-2-4(0)	39.00-39.50		
	SS-7	94	87	14	29	57.5	5.5	8.1	22	NP	A-2-4(0)	44.00-45.50		
	SS-8	92	61	24	53.9	22.5	10.4	13.1	23	NP	A-2-4(0)	54.00-55.50		
	SS-9	100	100	30	0.4	75.4	10.1	14.1	27	NP	A-2-4(0)	59.00-60.50		
	SS-10	100	97	85	4.4	20.4	32.7	42.4	78	35	A-7-5(37)	69.00-70.50		
B1-B	SS-11	100	92	18	25.6	57.3	5.1	12.1	15	NP	A-2-4(0)	1.00-1.50	54.7	
	SS-12	100	89	7	43.9	49.4	2.6	4	18	NP	A-3(0)	4.10-5.60		
	SS-13	100	99	7	7.5	88.8	2.7	1	23	NP	A-3(0)	18.80-20.30		
	SS-14	87	79	76	9.7	4.4	41.4	44.4	48	23	A-7-6(18)	23.80-24.80		
	SS-15	100	98	13	13.9	76.1	4.9	5.1	22	NP	A-2-4(0)	28.80-30.30		
	SS-16	73	50	14	53.9	28.5	5.5	12.1	21	NP	A-1-b(0)	38.80-40.30		
	SS-17	91	72	23	43.6	32.6	8.6	15.2	29	NP	A-2-4(0)	48.80-50.30		
	SS-18	91	62	24	52.8	23.2	10.8	13.1	22	NP	A-2-4(0)	53.80-55.30		
	SS-19	100	100	32	0.6	73.4	11.8	14.1	43	8	A-2-5(0)	58.80-60.30		
B2-A	SS-20	100	85	13	42.5	45.9	2.5	9.1	16	NP	A-2-4(0)	1.00-1.50	122.8	
	SS-21	100	92	17	33.5	51.3	7.1	8.1	31	NP	A-2-4(0)	8.60-10.10		
	SS-22	100	78	2	52.8	45.6	0.6	1	19	NP	A-3(0)	13.60-15.10		
	SS-23	100	99	32	6.7	82.2	5.1	6.1	21	NP	A-2-4(0)	18.60-20.10		
	SS-24	98	92	86	6.9	9.5	37.2	46.5	42	23	A-7-6(20)	23.60-25.10		
	SS-25	100	98	15	10.3	78	3.6	8.1	23	NP	A-2-4(0)	28.60-30.10		
	SS-26	81	47	17	56.9	24.5	4.4	14.1	25	NP	A-1-b(0)	38.60-40.10		
	SS-27	96	78	32	40.7	28.6	11.5	19.2	23	NP	A-2-4(0)	53.60-55.10		
	SS-28	100	100	31	0.8	74.2	8.8	16.2	27	4	A-2-4(0)	58.60-60.10		
EB2-B	SS-29	91	78	20	36.9	42.8	7.2	13.1	17	NP	A-2-4(0)	1.00-1.50	4.3	
	SS-30	100	90	11	31.5	58.2	4.2	6.1	34	NP	A-2-4(0)	8.70-10.20		
	SS-31	100	100	32	0.9	87.2	6.9	5.1	30	NP	A-2-4(0)	13.70-15.20		
	SS-32	97	90	84	8.7	6.9	31.9	52.5	49	26	A-7-6(23)	23.70-25.00		
	SS-33	97	91	13	19.1	70.5	2.3	8.1	26	NP	A-2-4(0)	28.70-30.20		

## BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	ORG.	MOI.
EB2-B	SS-34	83	46	17	58.6	23.6	1.6	16.2	22	NP	A-1-b(0)	33.70-35.20		
CONT.	SS-35	90	63	25	49.8	24.7	9.3	16.2	25	NP	A-2-4(0)	48.70-50.20		
	SS-36	100	100	34	0.6	71.7	9.5	18.2	29	9	A-2-4(0)	58.70-60.20		





FIELD  
 SCOUR REPORT

WBS: 34531.1.1 TIP: R-3324 COUNTY: BRUNSWICK

DESCRIPTION(1): BRIDGE ON -L- OVER TRIBUTARY TO DUTCHMAN'S CREEK

**EXISTING BRIDGE**

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

Bridge No.: NA Length: NA Total Bents: NA Bents in Channel: NA Bents in Floodplain: NA  
 Foundation Type: NA

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: NA

Interior Bents: NA

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

**EXISTING SCOUR PROTECTION**

Type(3): NA

Extent(4): NA

Effectiveness(5): NA

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 (SS-2)

Channel Bank Material(8): MUCK

Channel Bank Cover(9): TREES AND SHRUBS

Floodplain Width(10): 600' (+/-)

Floodplain Cover(11): TREES AND SHRUBS

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

Channel Migration Tendency(13): NONE

Observations and Other Comments: NO FLOW, POORLY DEFINED CHANNEL, WILL BE CHANNELIZED DURING CONSTRUCTION

**DESIGN SCOUR ELEVATIONS(14)**

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

**BENTS**

	B1	B2											
100 YR.	19.0	19.0											
500 YR.	18.5	18.5											

Comparison of DSE to Hydraulics Unit theoretical scour:  
 GEOTECHNICAL ANALYSIS AGREES WITH A MAXIMUM THEORETICAL SCOUR ELEVATION OF 19.0 FEET AS OUTLINED IN THE BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT:

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

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

See Sheet 7  
 "Soil Test Results",  
 for samples:  
 SS-2 (CHANNEL BED)

Reported by: *[Signature]*

Date: 5/7/2008

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34531.1.1 (R-3324)	1	8

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34531.1.1 I.D. NO. R-3324  
COUNTY BRUNSWICK  
PROJECT DESCRIPTION NEW ROUTE FROM NC 133 (LONG BEACH RD.) TO NC 133 AND NC 87 (RIVER RD.) NORTH OF NC 133 ON NC 87 (GEORGE II RD.)  
SITE DESCRIPTION BRIDGE ON -L- OVER JUMP AND RUN CREEK AT -L- STA. 22+02.9

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1.	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOG(S)
7-8	SOIL TEST RESULTS
9	SCOUR REPORT

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PERSONNEL  
J.R. SWARTLEY

T.C. BOTTOMS

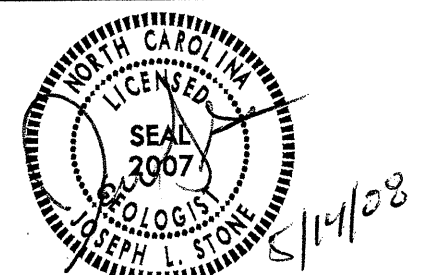
MACTEC PERSONNEL

INVESTIGATED BY JL STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE MAY, 2008



**PROJECT: 34531.1.1 ID: R-3324**

DRAWN BY: JL STONE

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.

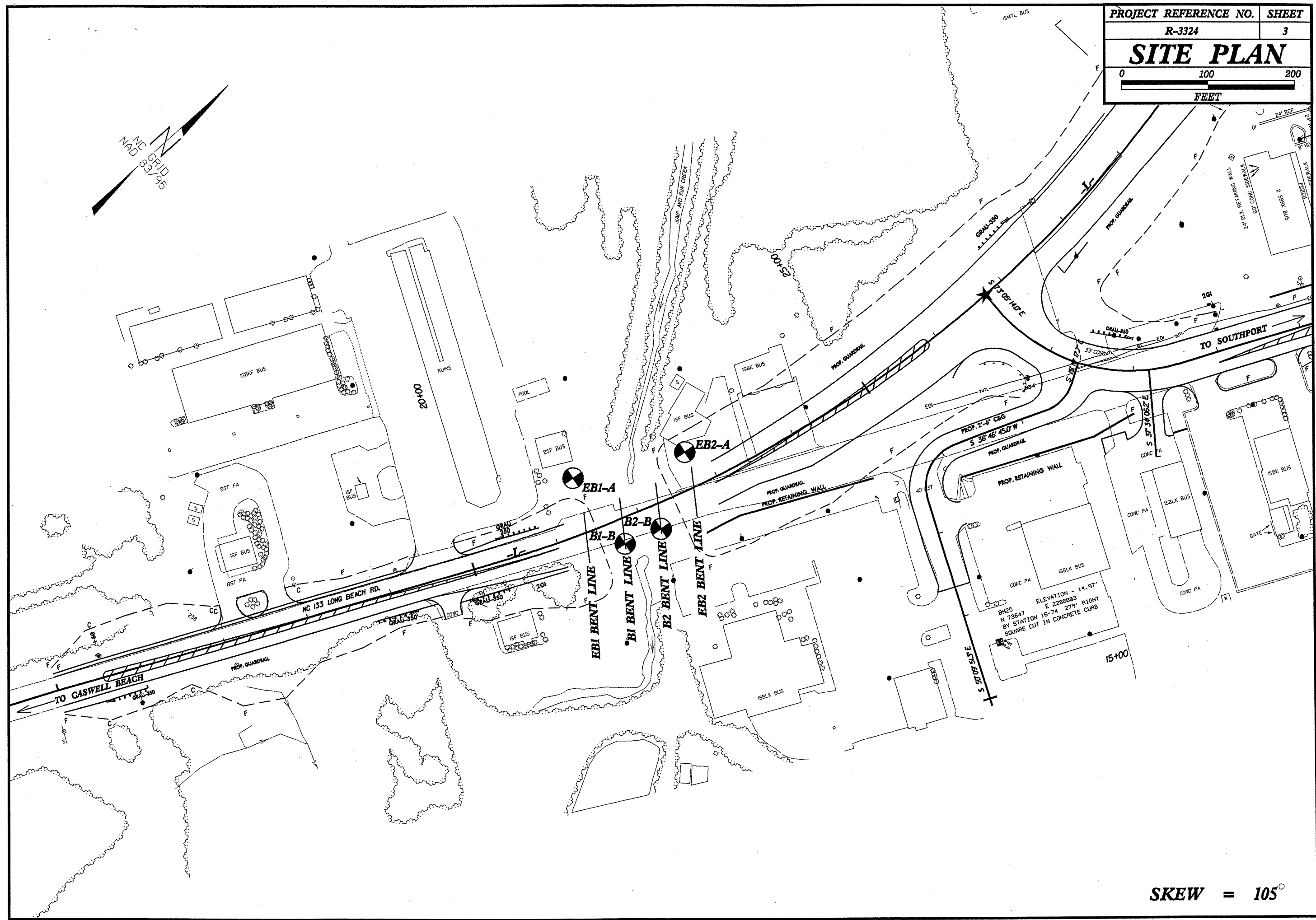
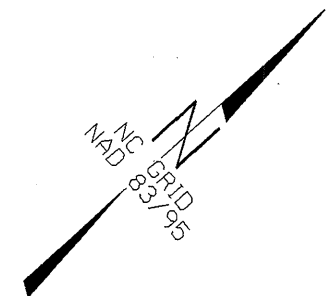
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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

**SUBSURFACE INVESTIGATION**

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

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 (ASHTO T296, 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, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	<b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORM</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b> , <b>SUBANGULAR</b> , <b>SUBROUNDED</b> , OR <b>ROUNDED</b> .	<b>HARD ROCK</b> 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: <b>WEATHERED ROCK (WR)</b> - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. <b>CRYSTALLINE ROCK (CR)</b> - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. <b>NON-CRYSTALLINE ROCK (NCR)</b> - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. <b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b> - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	<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>FALLT</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> - 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 (MOTJ)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING 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 (ROQ)</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 INTRUDED 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <b>STRATA CORE RECOVERY (SCREC)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROQ)</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>	<b>MINERALOGICAL COMPOSITION</b>	<b>WEATHERING</b>	
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	<b>FRESH</b> - ROCK FRESH, CRYSTALLINE SHELL, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. <b>VERY SLIGHT (V SLJ)</b> - 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. <b>SLIGHT (SLJ)</b> - 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. <b>MODERATE (MOD.)</b> - 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. <b>MODERATELY SEVERE (MOD. SEV.)</b> - 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> <b>SEVERE (SEV.)</b> - 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> <b>VERY SEVERE (V SEV.)</b> - 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> <b>COMPLETE</b> - 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>COMPRESSIBILITY</b>	<b>PERCENTAGE OF MATERIAL</b>	<b>GROUND WATER</b>	
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50	<b>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</b> <b>STATIC WATER LEVEL AFTER 24 HOURS</b> <b>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</b> <b>SPRING OR SEEP</b>	
<b>GRANULAR MATERIALS (&lt;= 35% PASSING #200)</b>	<b>ORGANIC MATERIAL</b>	<b>MISCELLANEOUS SYMBOLS</b>	
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7	TRACE OF ORGANIC MATTER 2-3% LITTLE ORGANIC MATTER 3-5% MODERATELY ORGANIC 5-10% HIGHLY ORGANIC >10%	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	
<b>TEXTURE OR GRAIN SIZE</b>	<b>ABBREVIATIONS</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	
U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270	HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS	DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST DIEDRICH D-50	
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>	<b>FRACURE SPACING</b>	<b>INDURATION</b>	
SOIL MOISTURE SCALE (ATTERBERG LIMITS): LL, PL, OM, SL	<b>VERY WIDE</b> MORE THAN 10 FEET <b>WIDE</b> 3 TO 10 FEET <b>MODERATELY CLOSE</b> 1 TO 3 FEET <b>CLOSE</b> 0.16 TO 1 FEET <b>VERY CLOSE</b> LESS THAN 0.16 FEET	<b>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</b> <b>FRIABLE</b> RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. <b>MODERATELY INDURATED</b> GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. <b>INDURATED</b> GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. <b>EXTREMELY INDURATED</b> SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
<b>PLASTICITY</b>	<b>INDURATION</b>	<b>FRACURE SPACING</b>	
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY	<b>INDURATION</b>	<b>INDURATION</b>	
<b>COLOR</b>	<b>INDURATION</b>	<b>INDURATION</b>	
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.	<b>INDURATION</b>	<b>INDURATION</b>	



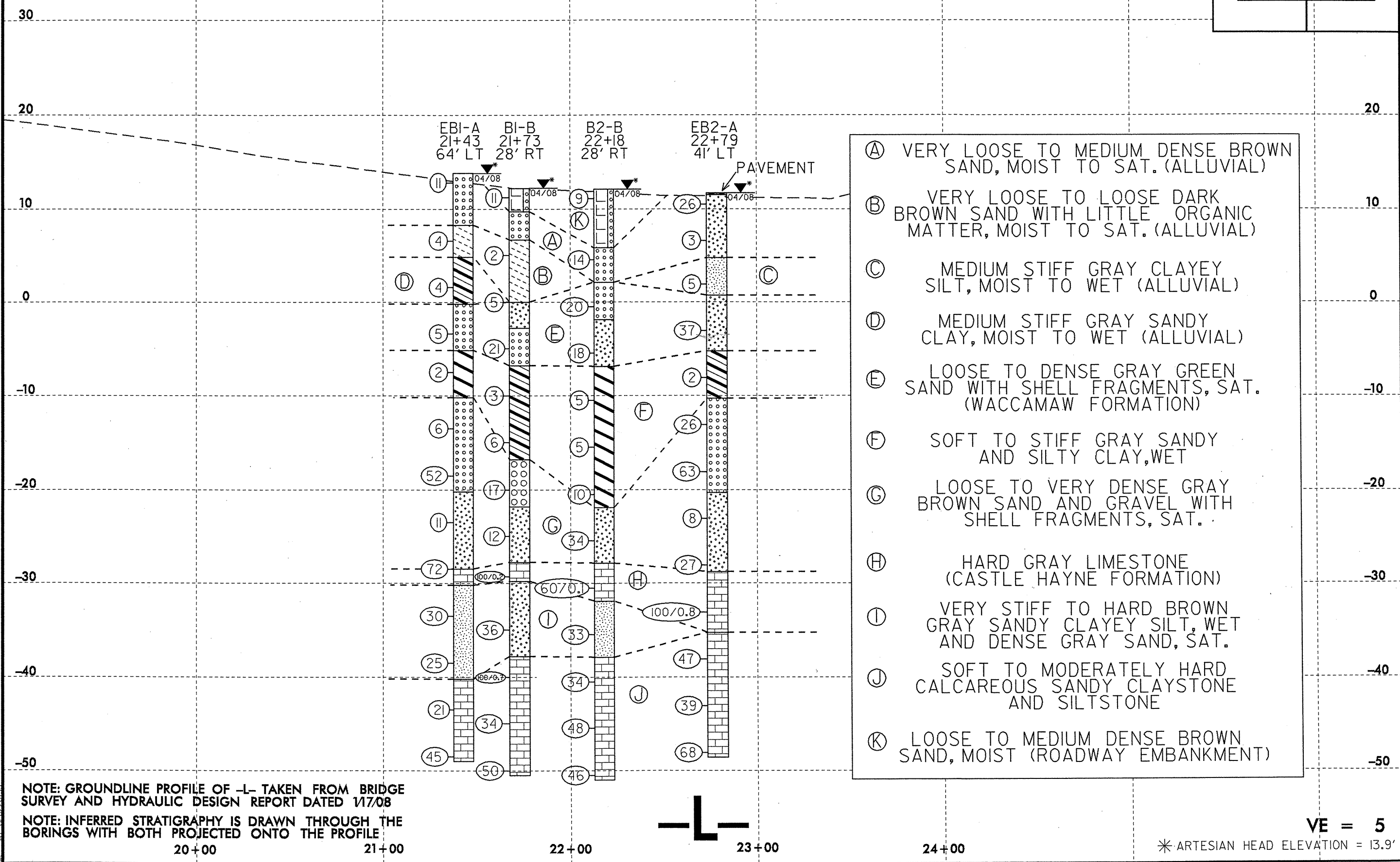
BM25  
 N 73647 E 2288003  
 ELEVATION = 14.97'  
 BY STATION 16+74 279' RIGHT  
 SQUARE CUT IN CONCRETE CURB

**SKEW = 105°**

5/14/99

PROJECT REFERENCE NO. R-3324	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

### PROFILE THROUGH BORINGS PROJECTED ALONG -L-



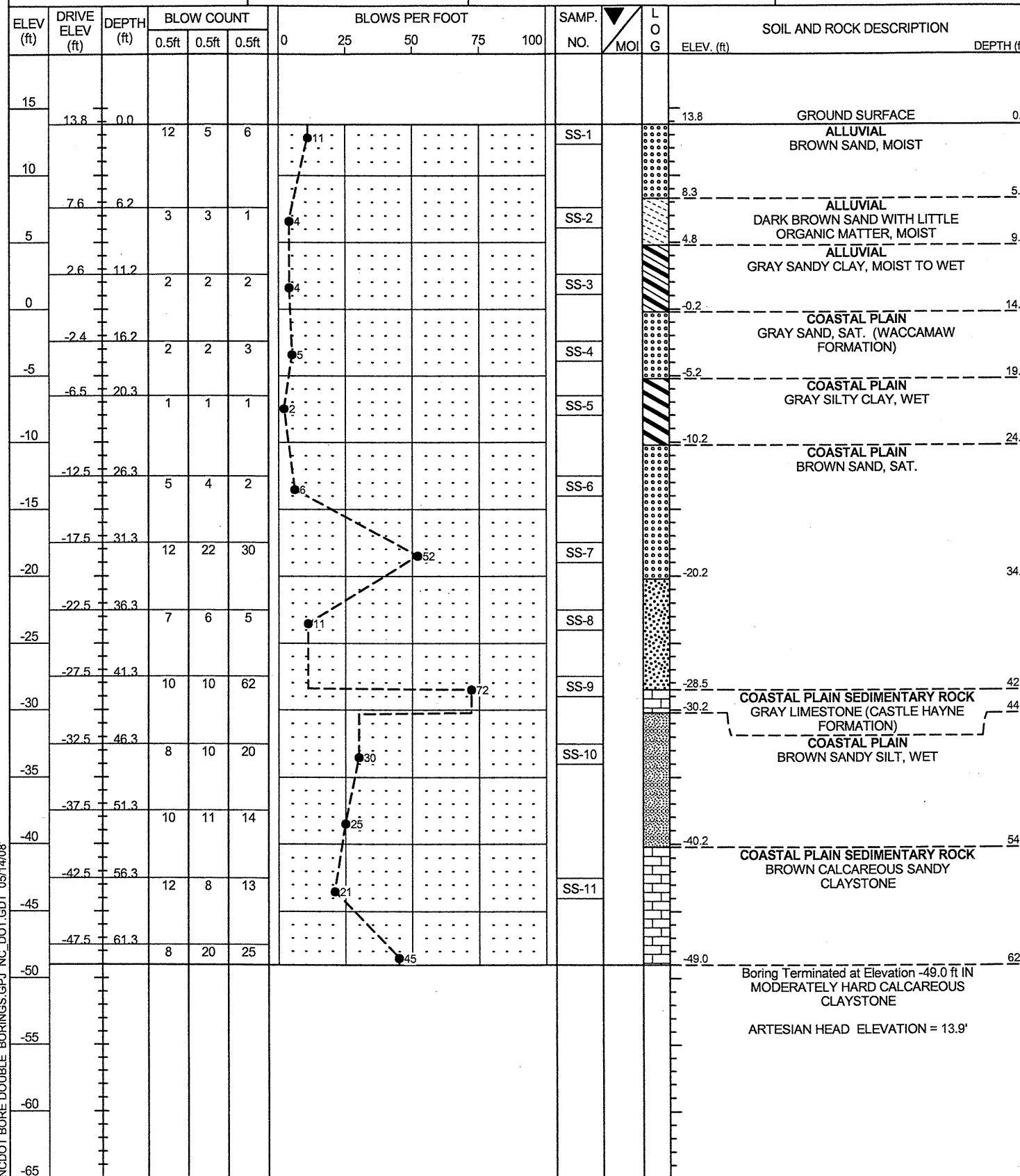
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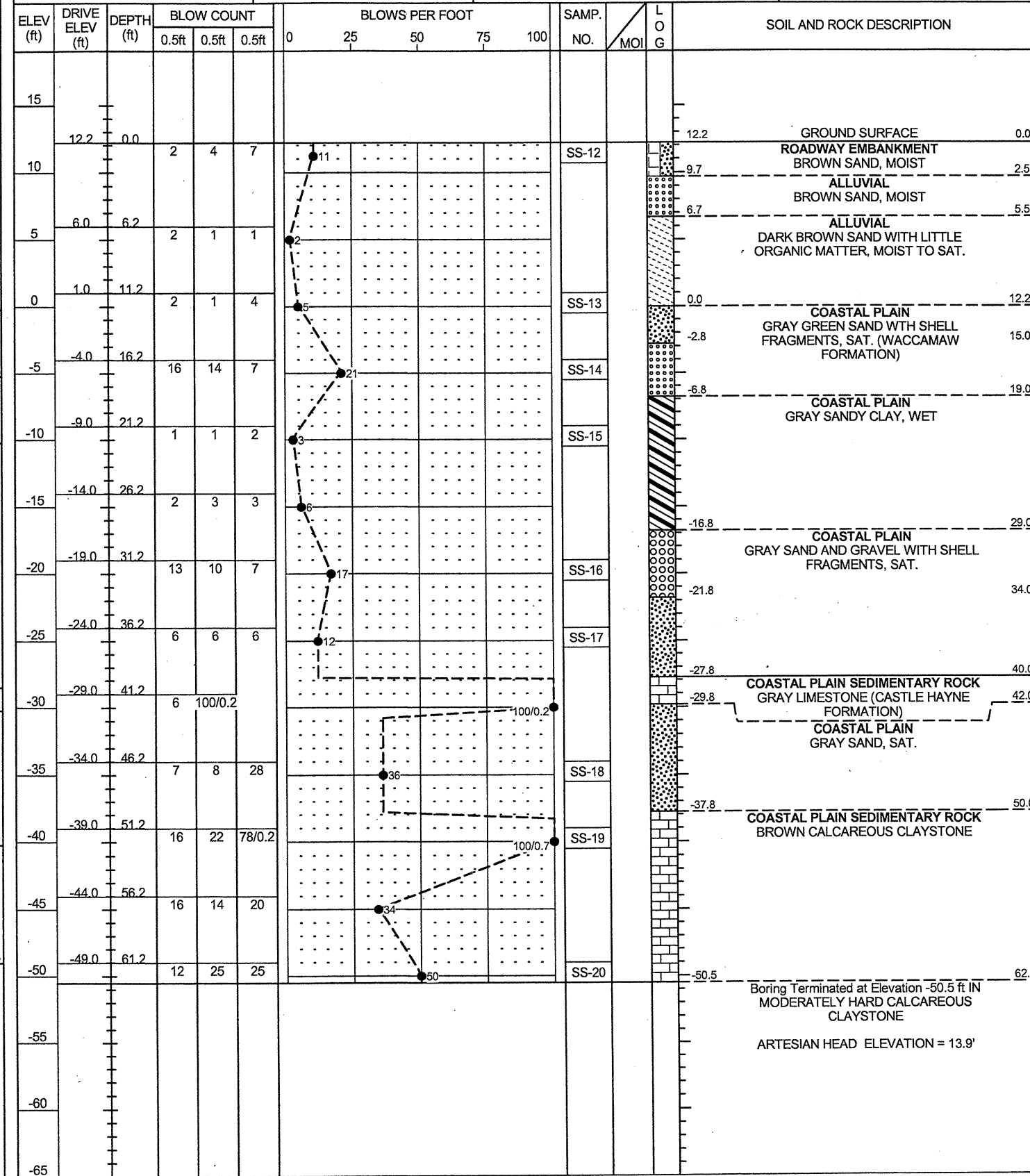
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE ON -L- OVER JUMP AND RUN CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 21+43	OFFSET 64ft LT	ALIGNMENT -L-
COLLAR ELEV. 13.8 ft	TOTAL DEPTH 62.8 ft	NORTHING 73,535	EASTING 2,287,488
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/02/08	COMP. DATE 04/02/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 42.3 ft



PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE ON -L- OVER JUMP AND RUN CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 21+73	OFFSET 28ft RT	ALIGNMENT -L-
COLLAR ELEV. 12.2 ft	TOTAL DEPTH 62.7 ft	NORTHING 73,503	EASTING 2,287,581
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/03/08	COMP. DATE 04/03/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 40.0 ft



NCDOT BORE DOUBLE BORINGS.GPJ NC\_DOT.GDT 05/14/08

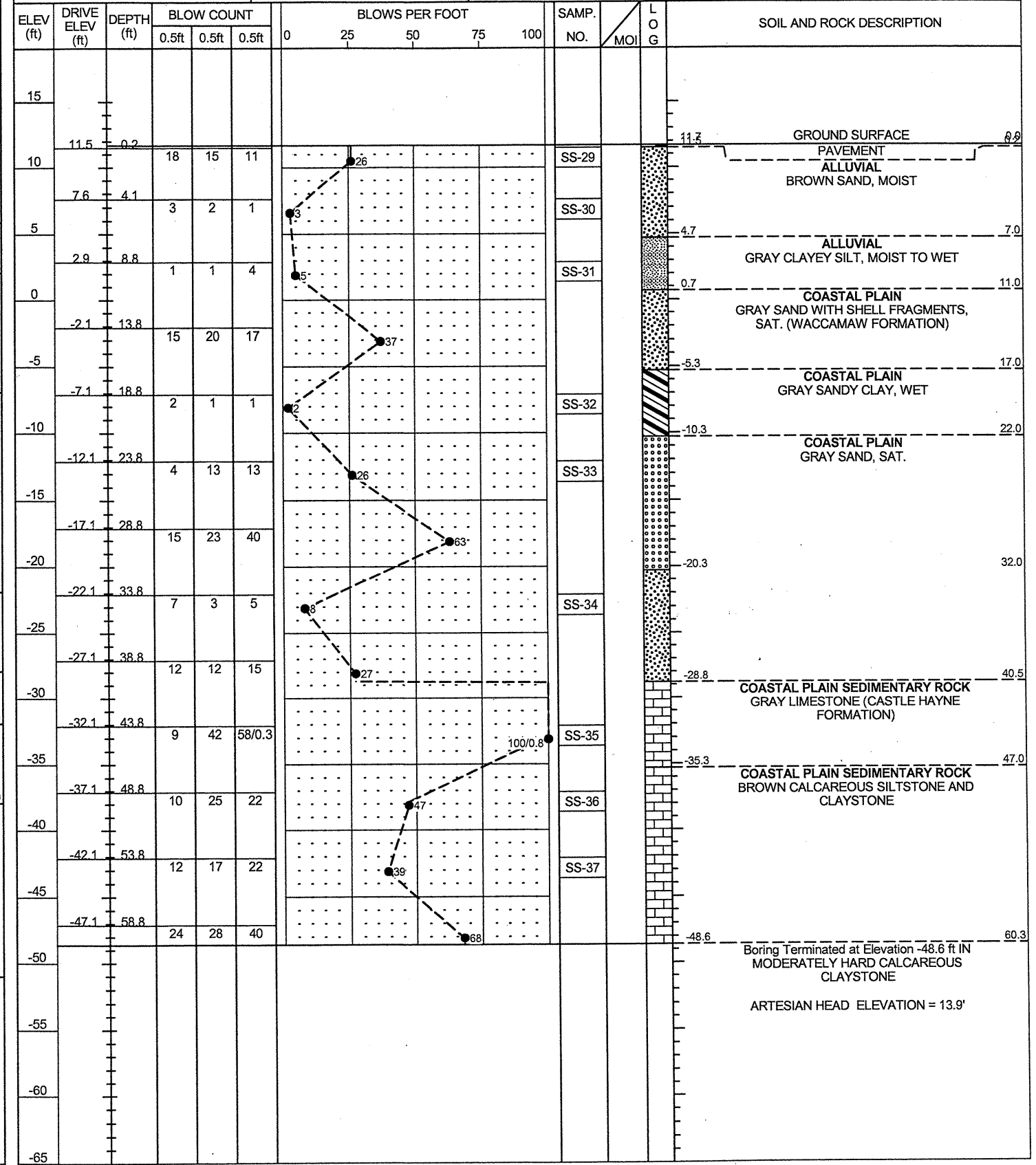
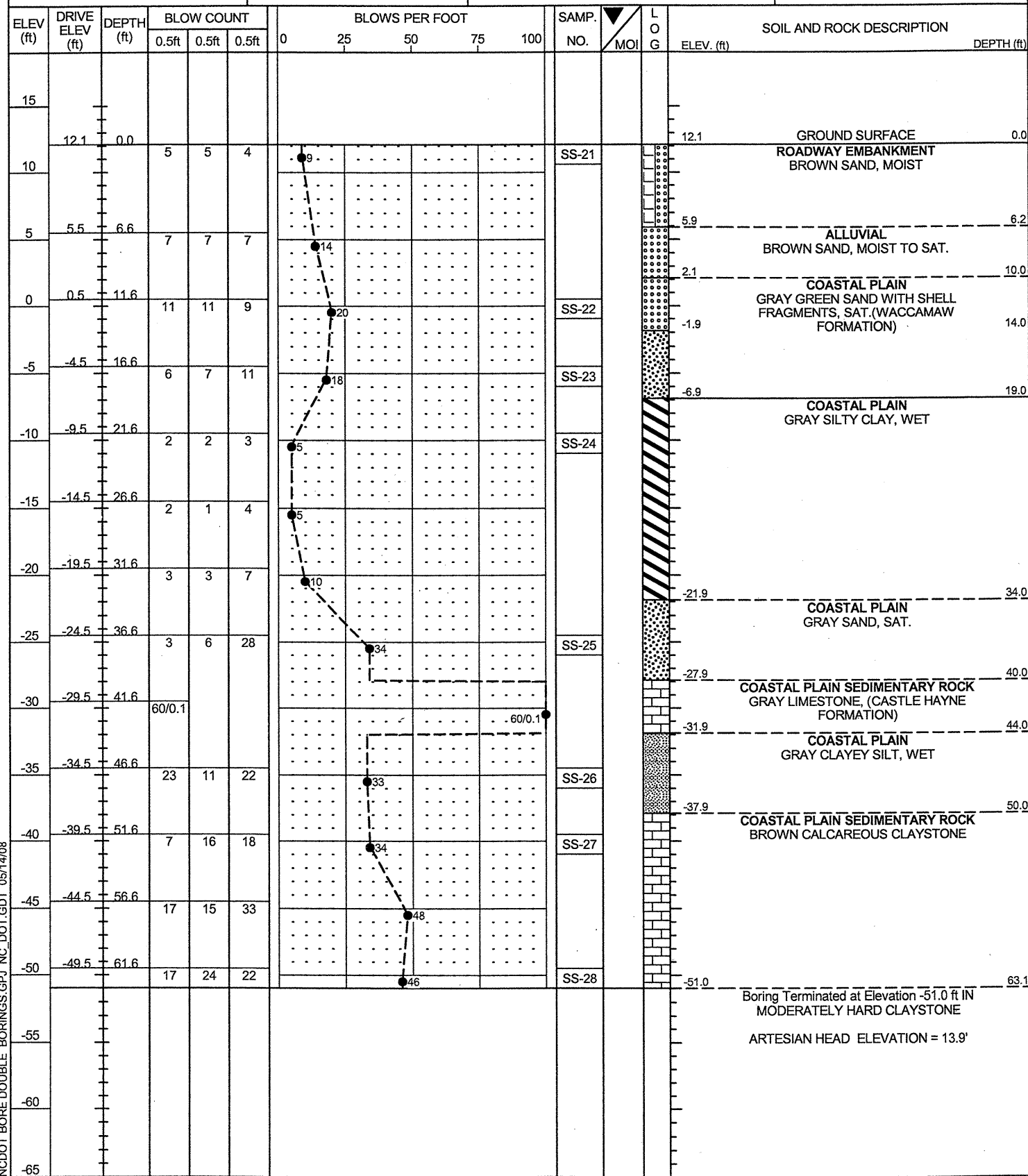


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE ON -L- OVER JUMP AND RUN CREEK			GROUND WTR (ft)
BORING NO. B2-B	STATION 22+18	OFFSET 28ft RT	ALIGNMENT -L-
COLLAR ELEV. 12.1 ft	TOTAL DEPTH 63.1 ft	NORTHING 73,536	EASTING 2,287,609
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/04/08	COMP. DATE 04/04/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 40.0 ft

PROJECT NO. 34531.1.1	ID. R-3324	COUNTY BRUNSWICK	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE ON -L- OVER JUMP AND RUN CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 22+79	OFFSET 41ft LT	ALIGNMENT -L-
COLLAR ELEV. 11.7 ft	TOTAL DEPTH 60.3 ft	NORTHING 73,629	EASTING 2,287,582
DRILL MACHINE DIEDRICH D-50	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 04/07/08	COMP. DATE 04/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 40.5 ft



NCDOT BORE DOUBLE BORINGS: GPJ NC DOT GDT 05/14/08

**R-3324**  
**BRIDGE ON -L- OVER JUMP AND RUN CREEK**

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CS	ES	AND	FINES	SAND	SI	CL	LL	PI	CLASS	DEPTH	ORG.	MOI.
EB1-A	SS-1	100	81	2	53.5	45.2	1.3	0.0	20	NP	A-3(0)	1.00-1.50					
	SS-2	98	96	10	22.7	70.3	6.0	1.0	27	NP	A-3(0)	6.20-7.70	4.30%				
	SS-3	97	81	57	22.9	24.1	34.8	18.2	29	11	A-6(4)	11.20-12.70					
	SS-4	100	99	7	1.0	93.6	5.4	0.0	18	NP	A-3(0)	16.20-17.70					
	SS-5	100	100	97	1.0	5.3	67.4	26.3	41	20	A-7-6(21)	20.30-21.80					
	SS-6	100	93	10	20.5	71.5	4.0	4.1	16	NP	A-3(0)	26.30-27.80					
	SS-7	98	68	5	61.6	34.7	0.7	3.0	11	NP	A-3(0)	31.30-32.80					
	SS-8	98	96	18	3.2	81.4	9.3	6.1	23	NP	A-2-4(0)	36.30-37.80					
	SS-9	100	99	17	4.6	81.2	9.2	5.1	24	NP	A-2-4(0)	41.30-42.30					
	SS-10	100	99	40	2.6	71.1	18.1	8.1	26	NP	A-4(0)	46.30-47.80					
	SS-11	100	100	70	2.2	48.8	30.7	18.2	39	13	A-6(8)	56.30-57.80					
B1-B	SS-12	94	86	9	33.6	57.2	5.1	4.1	18	NP	A-3(0)	1.00-1.50					
	SS-13	97	79	20	31.4	54.7	11.9	2.0	26	NP	A-2-4(0)	11.20-12.20					
	SS-14	99	96	10	4.0	87.9	5.1	3.0	23	NP	A-3(0)	16.20-17.70					
	SS-15	100	99	88	2.0	13.2	62.5	22.3	35	11	A-6(10)	21.20-22.70					
	SS-16	74	48	13	54.5	29.2	6.2	10.1	21	NP	A-1-b(0)	31.20-32.70					
	SS-17	96	94	16	4.1	82.0	7.9	6.1	25	NP	A-2-4(0)	36.20-37.70					
	SS-18	100	99	31	4.7	73.7	13.5	8.1	24	NP	A-2-4(0)	46.20-47.70					
	SS-19	100	100	83	0.4	32.6	34.5	32.4	52	24	A-7-6(22)	51.20-52.40					
	SS-20	100	98	86	2.6	21.1	27.7	48.6	92	46	A-7-5(49)	61.20-62.70					
B2-2	SS-21	99	93	9	32.1	59.4	5.5	3.0	21	NP	A-3(0)	1.00-1.70					
	SS-22	97	73	9	44.8	46.4	2.7	6.1	16	NP	A-3(0)	11.60-13.10					
	SS-23	100	99	25	1.8	74.9	9.1	14.2	22	NP	A-2-4(0)	16.60-18.10					
	SS-24	97	94	83	5.3	11.3	51.0	32.4	45	18	A-7-6(16)	21.60-23.10					
	SS-25	97	93	15	7.0	79.5	4.4	9.1	23	NP	A-2-4(0)	36.60-38.10					
	SS-26	100	100	56	0.4	60.0	19.4	20.3	30	3	A-4(0)	46.60-48.10					
	SS-27	100	99	78	3.4	33.4	28.7	34.4	49	21	A-7-6(17)	51.60-53.10					
	SS-28	100	96	83	5.5	20.9	27.1	46.6	81	36	A-7-5(37)	61.60-63.10					
EB2-A	SS-29	100	94	16	30.5	57.2	4.2	8.1	19	NP	A-2-4(0)	1.00-1.50					
	SS-30	100	89	11	35.7	56.3	1.9	6.1	22	NP	A-2-4(0)	4.10-5.60					
	SS-31	96	80	58	23.1	21.7	32.9	22.3	28	10	A-4(3)	8.80-10.30					
	SS-32	100	99	94	1.4	10.3	56.8	34.4	39	16	A-6(16)	18.80-20.30					
	SS-33	100	92	6	18.5	76.1	0.3	5.1	22	NP	A-3(0)	23.80-25.30					
	SS-34	96	89	18	11.1	72.5	4.2	12.2	25	NP	A-2-4(0)	33.80-35.30					
	SS-35	100	100	30	2.2	77.9	10.7	9.1	26	NP	A-2-4(0)	43.80-45.10					
	SS-36	100	98	55	3.4	57.5	18.7	20.3	40	8	A-4(3)	48.80-50.30					
	SS-37	100	96	88	5.1	15.8	36.4	42.6	75	37	A-7-5(40)	53.80-55.30					





FIELD  
 SCOUR REPORT

WBS: 34531.1.1 TIP: R-3324 COUNTY: BRUNSWICK

DESCRIPTION(1): BRIDGE ON -L- OVER JUMP AND RUN CREEK

**EXISTING BRIDGE**

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

Bridge No.: NA Length: NA Total Bents: NA Bents in Channel: NA Bents in Floodplain: NA  
 Foundation Type: NA

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: NA

Interior Bents: NA

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

**EXISTING SCOUR PROTECTION**

Type(3): rip rap along channel banks

Extent(4): north and south side of channel at proposed bridge site

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): NA

Channel Bank Material(8): SAND (SS-1, SS-29)

Channel Bank Cover(9): SHRUBS

Floodplain Width(10): 250' (+/-)

Floodplain Cover(11): SHRUBS

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

Channel Migration Tendency(13): VERY LOW

Observations and Other Comments: STREAM HAS BEEN CHANNELIZED

**DESIGN SCOUR ELEVATIONS(14)**

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

**BENTS**

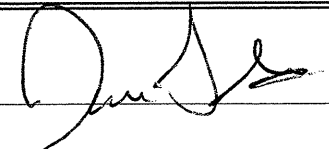
	B1	B2											
100 YR.	0.0	2.0											
500 YR.	-3.0	-1.0											

Comparison of DSE to Hydraulics Unit theoretical scour:  
 GEOTECHNICAL ANALYSIS AGREES WITH A MAXIMUM THEORETICAL SCOUR ELEVATION OF 0.0 FEET FOR BENT 1 AND 2.0 FEET FOR BENT 2, AS OUTLINED IN THE BRIDGE SURVEY REPORT.

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

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

See Sheet 7  
 "Soil Test Results",  
 for samples:  
 SS-1, SS-29 (CHANNEL BANK)

Reported by:  Date: 5/7/2008