STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33497.1.1 (B-4148)	1	9
STATE PROJ. NO.		DESCRIPTION	
		P.E.	
		CONST.	

PROJECT: 33497.1.1 ID: B-4148

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33497.1.1 I.D. NO. B-4148

F.A. PROJECT

COUNTY HENDERSON

PROJECT DESCRIPTION BRIDGE NO. 12 ON SR-1329 OVER BOYLSTON CREEK

SITE DESCRIPTION

CONTENTS:

CAUTION NOTICE

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

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

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

PERSONNEL T.B. DANIEL
C.J. COFFEY
G.K. ROSE
L.E. LANKFORD

INVESTIGATED BY P.Q. LOCKAMY

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 11/07 (REV)

DRAWN BY: J.T.WILLIAMS

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 LICENSED SEAL 1907 GEOLOGIST Patrick Q. Lockamy

P.Q. Lockamy 11-16-07

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4148	33497.1.1	2	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		N.P.	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12"	3"				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW — PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT OPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] OTHER _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
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.
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.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
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*
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.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
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.
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.

FRACTURE SPACING

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

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: -BL-3- STA 15+51.36, 12.74' RT -L-

ELEVATION: 2089.75 FT

NOTES:

PROJECT REFERENCE NO.	SHEET
33497.1.1 B-4148	3

SITE PLAN

0 50 100
FEET

SKEW = 70°

PT Sta. 13+72.73

15

BEGIN BRIDGE
–L– STA. 15+43.00

REMOVE EXISTING BRIDGE

END BRIDGE
–L– STA. 15+98.00

EB1–A
15+35
14 LT

EB2–A
15+96
12 LT

SR 1329 –L–

END TIP PROJECT B–4148
STA. 17+90.00

EB1–B
15+43
14 RT

EB2–B
16+02
11 RT

BEGIN TIP PROJECT B–4148
–L– STA 13+60

-BL-3 11+11.60 PINC
-L- 15+51.36
12.74' RT
EL. 2089.75

BOYLSTON CREEK

PC Sta. 16+07.90

PT Sta. 17+13.18

PC Sta. 17+21.49

PT Sta. 20+25.72

TO US64

20

N

PROJECT REFERENCE NO.	SHEET
33497.1.1 B-4148	4

BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK

PROFILE 14' LT OF -L-

0 10 20
FEET
VE = 1

2110
2100
2090
2080
2070
2060
2050
2040

(A) EMBANKMENT, RED TO BROWN, SANDY CLAY AND CLAYEY, FINE, SANDY SILT

(B) EMBANKMENT, BROWN, SILTY SAND W/ GRAVEL

EXISTING GROUND

EB1-A
15+35
14 LT

EB2-A
15+96
12 LT

WATER SURFACE 03/05

ALLUVIAL, DARK GRAY, SLIGHTLY ORGANIC, FINE SANDY SILT W/ TRACE MICA

ALLUVIAL, DARK GRAY FINE SANDY SILT

SAPROLITE, GRAY TO GREEN TO TAN, FINE SANDY SILT

SAPROLITE, GRAY-BLUE, VERY FINE SANDY SILT

WEATHERED ROCK, WITH ZONES OF HARD FINE SANDY SILT

EB1-A		EB2-A	
2	03/05	3	03/05
1		7	
5		11	
62		13	
66		84	
100/0.6		100/0.7	
50/0.3		43	
50/0.1		100/0.3	
B.T.		B.T.	

15+00
15+50
16+00

0	10	20
FEET		
VE = 1		

PROJECT REFERENCE NO.	SHEET
33497.1.1 B-4148	5
BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK	

SECTION THRU EB1

2110
2100
2090
2080
2070
2060
2050
2040

(A) EMBANKMENT, RED TO BROWN, CLAYEY, FINE, SANDY SILT AND SANDY CLAY

EXISTING GROUND

EBI-A
15+35
14 LT

EBI-B
15+43
14 RT

(A)

(2) 03/05 (1) ALLUVIAL, DARK GRAY, FINE SANDY SILT W/ ROOTS, INTERMITTENT SAND W/ GRAVEL AND TRACE MICA

(WOH) 03/05 (7) ALLUVIAL, FINE TO COARSE SAND W/ GRAVEL

(5) (19)

(62) SAPROLITE, GRAY TO GREEN TO TAN FINE SANDY SILT (22)

(66) (61)

(100/0.6) (45)

WEATHERED ROCK W/ LENSES OF HARD FINE SANDY SILT

(50/0.3) (50/0.1) (50/0.3)

B.T. B.T.

℄

50 40 30 20 10 0 10 20 30 40 50

0 10 20 FEET VE = 1	PROJECT REFERENCE NO.	SHEET
	33497.1.1 B-4148	6
	BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK	

SECTION THRU EB2

(A) EMBANKMENT, RED TO BROWN, FINE SANDY SILT AND SILTY SAND W/ GRAVEL

EB2-A
15+96
12 LT

EXISTING GROUND

EB2-B
16+02
11 RT

(A)

3
03/05

ALLUVIAL, DARK GRAY, FINE SANDY SILT W/ ROOTS AND INTERMITTENT SAND W/GRAVEL, CLAY AND TRACE MICA

7
03/05

3

11

5

SAPROLITE, GRAY TO GREEN TO TAN, FINE SANDY SILT

13

12

84

100/0.9

WEATHERED ROCK, WITH LENSES OF HARD FINE SANDY SILT

100/0.7

100/0.6

B.T.

43

100/0.3

B.T.

2110
2100
2090
2080
2070
2060
2050
2040

40 30 20 10 0 10 20 30 40

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 33497.1.1	**ID.** B-4148	**COUNTY** HENDERSON	**GEOLOGIST** Daniel, T. B.	
SITE DESCRIPTION BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+35	**OFFSET** 14ft LT	**ALIGNMENT** -L-	**0 HR.** 7.2
COLLAR ELEV. 2,090.1 ft	**TOTAL DEPTH** 38.6 ft	**NORTHING** 607,166	**EASTING** 932,792	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/10/05	**COMP. DATE** 03/10/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
	2095									2,090.1	GROUND SURFACE	0.0
2090	2,086.6	3.5	0	0	2	2				2,088.1	**ROADWAY EMBANKMENT** RED TO BROWN, SANDY CLAY AND CLAYEY, FINE, SANDY SILT	2.0
2085	2,081.6	8.5	0	0	1	1					**ALLUVIAL** DARK GRAY, SLIGHTLY ORGANIC, FINE SANDY SILT W/ TRACE MICA	
2080	2,076.6	13.5	2	2	3	5				2,078.3		11.8
2075	2,071.6	18.5	6	20	42	62					**SAPROLITE** GRAY TO GREEN, FINE SANDY SILT	
2070	2,066.6	23.5	30	24	42	66						
2065	2,061.6	28.5	12	80	20	100/0.6				2,061.1	**WEATHERED ROCK** W/ LENSES OF HARD FINE SANDY SILT	29.0
2060	2,056.6	33.5	50/0.3			50/0.3						
2055	2,051.6	38.5	50/0.1			50/0.1				2,051.5	Boring Terminated at Elevation 2,051.5 ft IN WEATHERED ROCK	38.6
2050												
2045												
2040												
2035												
2030												
2025												
2020												
2015												

PROJECT NO. 33497.1.1	**ID.** B-4148	**COUNTY** HENDERSON	**GEOLOGIST** Daniel, T. B.	
SITE DESCRIPTION BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 15+43	**OFFSET** 14ft RT	**ALIGNMENT** -L-	**0 HR.** 7.2
COLLAR ELEV. 2,090.3 ft	**TOTAL DEPTH** 38.7 ft	**NORTHING** 607,140	**EASTING** 932,779	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/10/05	**COMP. DATE** 03/10/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
	2095									2,090.3	GROUND SURFACE	0.0
2090	2,086.9	3.4	WOH	WOH	WOH	0				2,088.3	**ROADWAY EMBANKMENT** CLAYEY, SANDY SILT	2.0
2085	2,081.9	8.4	1	2	5	7					**ALLUVIAL** DARK GRAY, SLIGHTLY ORGANIC, FINE SANDY SILT W/ ROOTS AND TRACE MICA	
2080	2,076.9	13.4	2	4	15	19				2,078.9		11.4
2075	2,071.9	18.4	9	11	11	22				2,077.9	**ALLUVIAL** FINE TO COARSE SAND W/ GRAVEL	12.4
2070	2,066.9	23.4	12	25	36	61					**SAPROLITE** GRAY TO GREEN TO TAN FINE SANDY SILT	
2065	2,061.9	28.4	19	18	27	45				2,059.1	**WEATHERED ROCK** W/ LENSES OF HARD FINE SANDY SILT	31.2
2060	2,056.9	33.4	50/0.3			50/0.3						
2055	2,051.9	38.4	50/0.3			50/0.3				2,051.6	Boring Terminated at Elevation 2,051.6 ft IN WEATHERED ROCK	38.7
2050												
2045												
2040												
2035												
2030												
2025												
2020												
2015												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 33497.1.1	**ID.** B-4148	**COUNTY** HENDERSON	**GEOLOGIST** Daniel, T. B.	
SITE DESCRIPTION BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 15+96	**OFFSET** 12ft LT	**ALIGNMENT** -L-	**0 HR.** 6.3
COLLAR ELEV. 2,090.6 ft	**TOTAL DEPTH** 38.8 ft	**NORTHING** 607,123	**EASTING** 932,835	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/11/05	**COMP. DATE** 03/11/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2090	2095									2,090.6 GROUND SURFACE	0.0
	2,087.1	3.5	3	1	2	3				**ROADWAY EMBANKMENT** BROWN, SILTY SAND W/ GRAVEL 2,086.6	4.0
2085										**ALLUVIAL** DARK GRAY FINE SANDY SILT	
	2,082.1	8.5	-	-	-						
2080											
	2,077.1	13.5	0	4	7	11					
2075											
	2,072.1	18.5	4	6	7	13					
2070											
	2,067.1	23.5	17	36	48	84					
2065											
	2,062.1	28.5	40	60/0.2		100/0.7					
2060											
	2,057.1	33.5	20	21	22	43				2,064.3 **WEATHERED ROCK**	26.3
2055											
	2,052.1	38.5	100/0.3			100/0.3				2,058.6 FINE SANDY SILT	32.0
2050										2,055.6 **WEATHERED ROCK**	35.0
2045										2,051.8 Boring Terminated at Elevation 2,051.8 ft IN WEATHERED ROCK	38.8
2040											
2035											
2030											
2025											
2020											
2015											

PROJECT NO. 33497.1.1	**ID.** B-4148	**COUNTY** HENDERSON	**GEOLOGIST** Daniel, T. B.	
SITE DESCRIPTION BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 16+02	**OFFSET** 11ft RT	**ALIGNMENT** -L-	**0 HR.** 5.8
COLLAR ELEV. 2,089.6 ft	**TOTAL DEPTH** 29.5 ft	**NORTHING** 607,102	**EASTING** 932,824	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/11/05	**COMP. DATE** 03/11/05	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
2090	2090									2,089.6 GROUND SURFACE	0.0
	2,086.2	3.4	-	-	-					**ROADWAY EMBANKMENT** 2,087.6 RED TO BROWN, FINE SANDY SILT	2.0
2085										**ALLUVIAL** BROWN, CLAYEY, FINE SANDY SILT W/ ROOTS AND BASAL GRAVEL 2,083.4	6.2
	2,081.2	8.4	1	2	1	3				**ALLUVIAL** GRAY TO GREEN, FINE SANDY SILT 2,078.4	11.2
2080										**SAPROLITE** BROWN, BASAL SAND	
	2,076.2	13.4	0	2	3	5					
2075											
	2,071.2	18.4	6	6	6	12					
2070											
	2,066.2	23.4	16	38	62	100/0.9				2,068.4 **WEATHERED ROCK**	21.2
2065											
	2,061.2	28.4	100/0.6			100/0.6				2,060.1 Boring Terminated at Elevation 2,060.1 ft IN WEATHERED ROCK	29.5
2060											
2055											
2050											
2045											
2040											
2035											
2030											
2025											
2020											
2015											
2010											

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33497.1.1 TIP: B-4148 COUNTY: HENDERSON

DESCRIPTION(1): BRIDGE NO. 12 ON SR 1329 OVER BOYLSTON CREEK

EXISTING BRIDGE

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

Bridge No.: 12 Length: 30.5 Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
Foundation Type: TIMBER PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE

Interior Bents: N/A

Channel Bed: SANDY BED LOAD HAS ALL SCOUR HOLES FILLED.

Channel Bank: MINOR - INTERMITTENT EXPOSED SOIL ON VERTICAL BANKS.

EXISTING SCOUR PROTECTION

Type(3): TIMBER ABUTMENT AND WINGS

Extent(4): CREEK BED TO ROADWAY

Effectiveness(5): VERY GOOD

Obstructions(6): LARGE LOG ACROSS CK. UPSTREAM HAS 2 FEET OF RECENT SEDS. ACCUMULATED

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 theoritical 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): SILTY SAND W/ PEA GRAVEL (ABOUT 1/4 TO 3/8 INCH ROUNDED QUARTZ)

Channel Bank Material(8): CLAYEY AND SANDY SILT

Channel Bank Cover(9): WEEDS - BRUSH - BARE SOIL

Floodplain Width(10): ESTIMATE 800 FEET

Floodplain Cover(11): ROW CROPS

Stream is(12): Aggrading XXX Degrading ____ Static ____

Channel Migration Tendency(13): LONG TERM MIGRATION TO EAST CONTROLLED BY BEDROCK STRUCTURE.

Observations and Other Comments: STREAM TERRACES TO WEST AND STEEP VALLEY WALLS TO THE EAST.

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

	ELEVATION
CHANNEL	2081.5
EB1	2085.2
EB2	2084.7

Comparison of DSE to Hydraulics Unit theoretical scour:
GEOTECHNICALB ENGINEERING UNIT AGREES WITH HYDRAULICS UNIT THEORETICAL SCOUR DATED 5/15/07. THIS IS BASED ON A FIVE YEAR SCOUR.

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							

Reported by: PQ Lockamy Date: 11/16/2007
PQ LOCKAMY