STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	32649.1.1	1	5

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 32649.1.1 (B-2532) F.A. PROJ. BRSTP-0708(4)

COUNTY CRAVEN

PROJECT DESCRIPTION BRIDGE NO. 60 ON US 70 BUSINESS OVER THE TRENT RIVER

SITE DESCRIPTION RETAINING WALL 1 LEFT OF -L- AT STA. 36+00 AND WALL 2 RIGHT OF -L- AT STA. 36+00

ID: B-2532

PROJECT: 32649.1.1

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CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-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

KBQ

WNC

LWD

RES

FMW

INVESTIGATED BY F. M. WESCOTT

CHECKED BY D. N. ARGENBRIGHT

SUBMITTED BY D. N. ARGENBRIGHT

DATE FEBRUARY 2006

NORTH CAROLINA LICENSED SEAL 1050 GEOLOGIST D. N. ARGENBRIGHT

2-17-06

DRAWN BY: W. D. FIELDS

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.

PROJECT REFERENCE NO.	SHEET NO.
32649.1.1 (B-2532)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING 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 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. 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 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 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	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	2.00	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, YELLOW-BROWN, 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 IS 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 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 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 SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — 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
RM - RESILIENT MODULUS SAMPLE
RS - ROCK SAMPLE
RT - RECOMPACTED TRIAXIAL SAMPLE
CBR - CALIFORNIA BEARING RATIO 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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " 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 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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
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 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*
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 GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S 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 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 (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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

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

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

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

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

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - 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.

BENCH MARK:

ELEVATION: FT.

NOTES:

REVISED 03/07/05

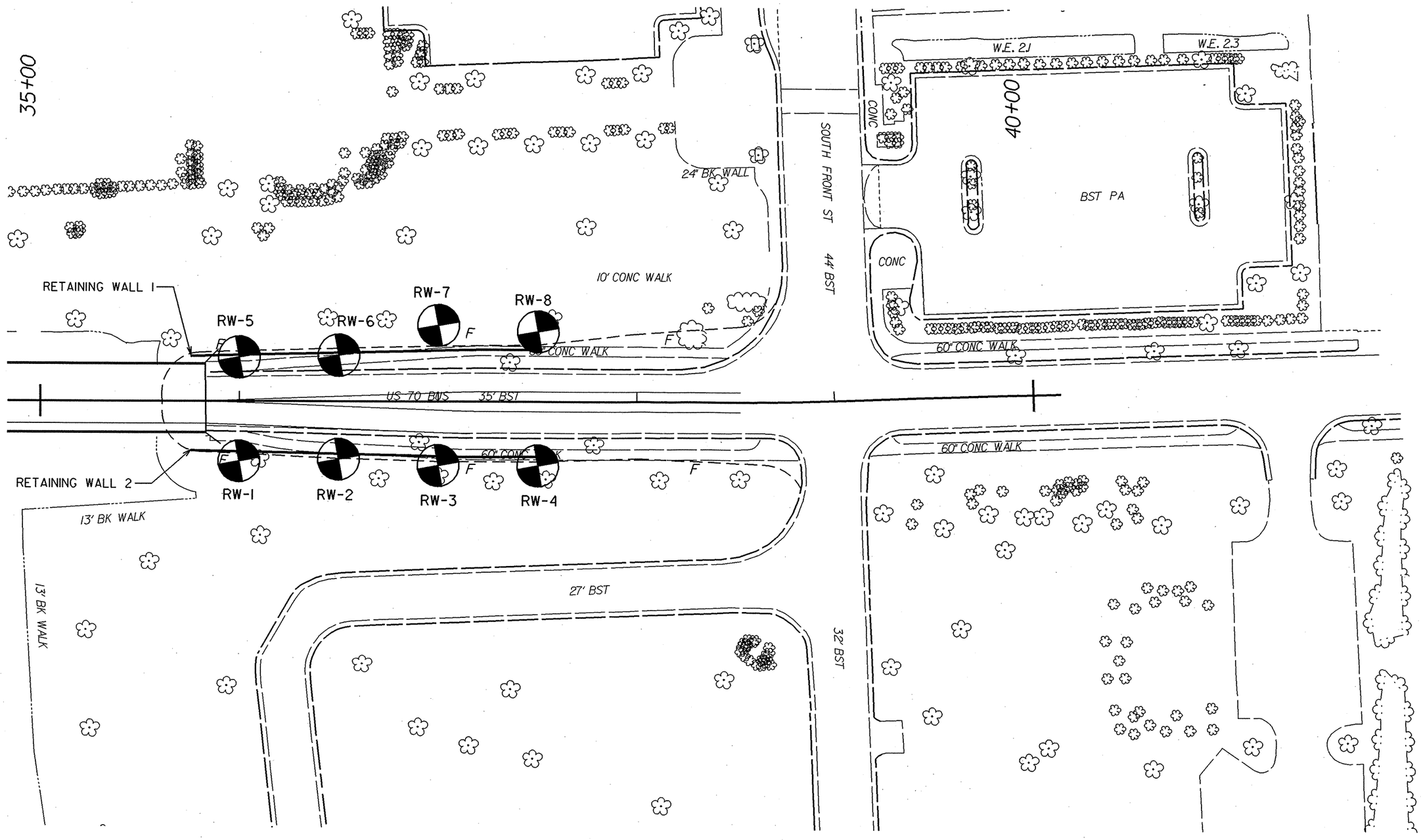
PROJECT REFERENCE NO.	SHEET
32649.1.1	3

SITE PLAN

0 50 100

FEET

TEST SITE PLAN (WALL 1 & WALL 2)

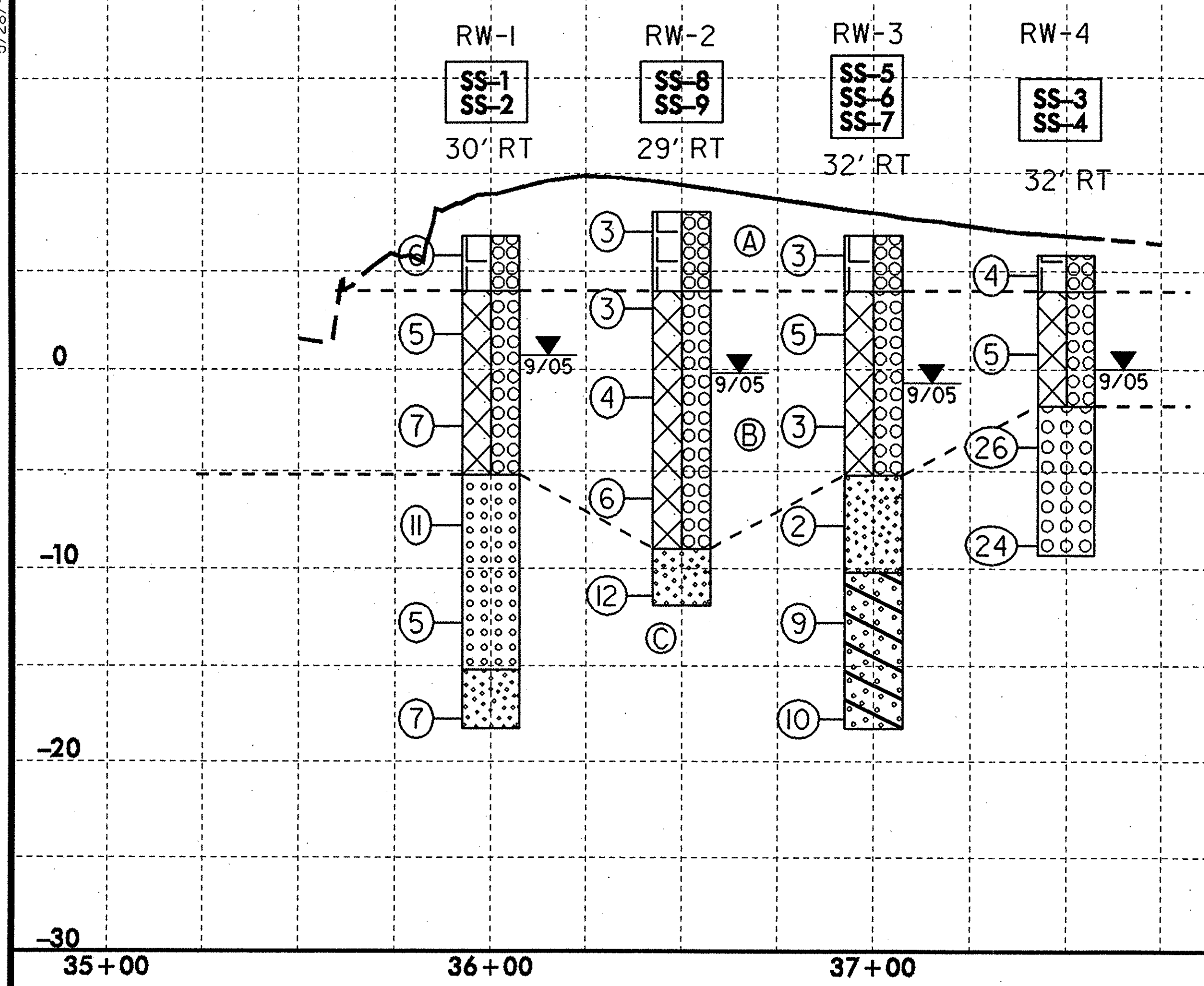


PROJECT REFERENCE NO.	SHEET NO.
B-2532	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROFILE THROUGH BORINGS ALONG RETAINING WALL 1

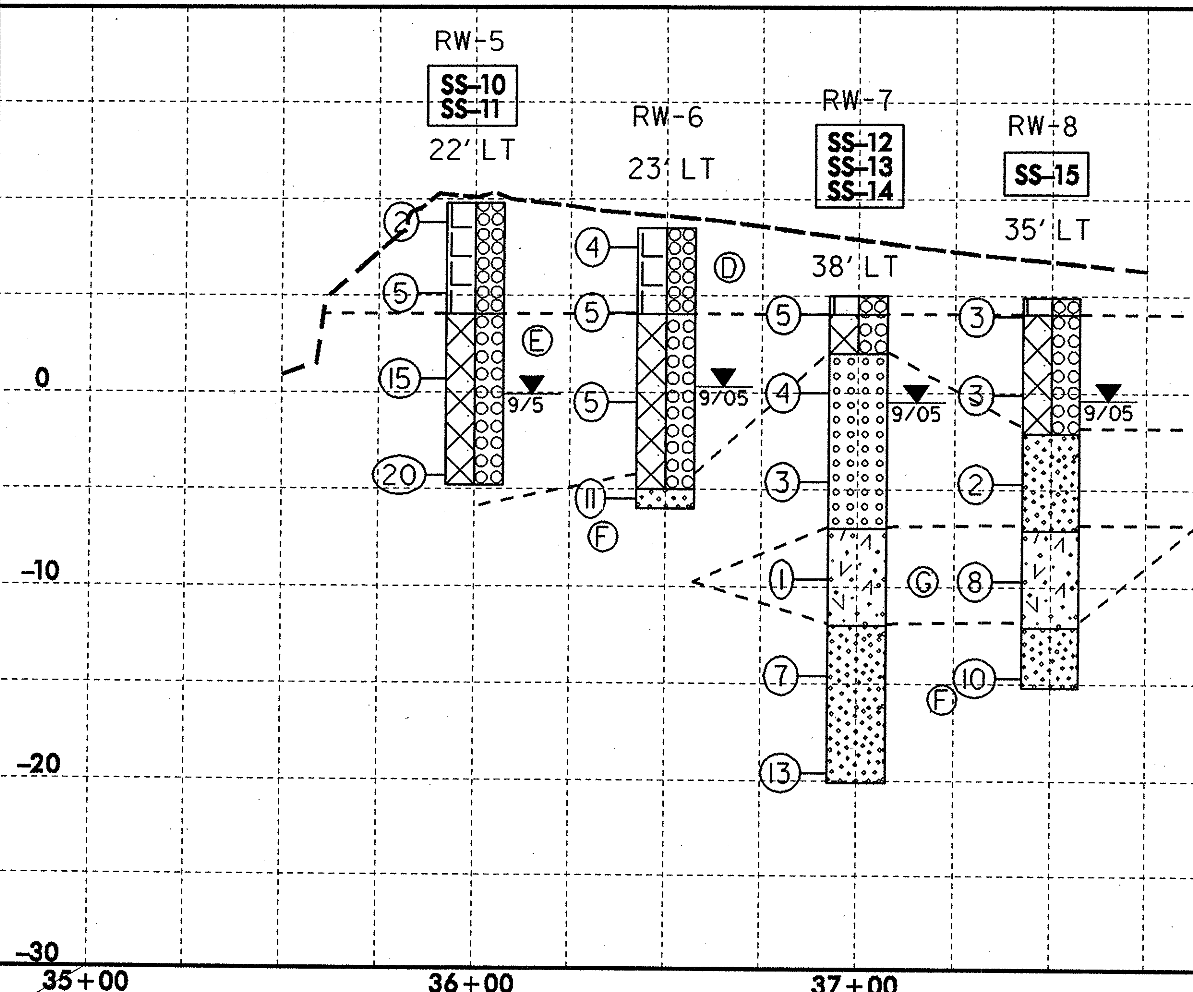


Ⓐ VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

Ⓑ VERY LOOSE TO LOOSE TAN BROWN SAND WITH FILL DEBRIS, MOIST TO SATURATED (ARTIFICIAL FILL)

Ⓒ LOOSE TO MEDIUM DENSE TAN GRAY SAND AND SILTY CLAYEY SAND WITH SHELL FRAGMENTS, SATURATED

PROFILE THROUGH BORINGS ALONG RETAINING WALL 2



Ⓓ VERY LOOSE TO MEDIUM DENSE TAN BROWN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

Ⓔ VERY LOOSE TO MEDIUM DENSE TAN BROWN SAND WITH FILL DEBRIS, MOIST TO SATURATED (ARTIFICIAL FILL)

Ⓕ VERY LOOSE TO MEDIUM DENSE GRAY SAND, SATURATED

Ⓖ VERY SOFT TO MEDIUM STIFF TAN SILT WITH SHELL FRAGMENTS, WET

-L-

Proj. No. 32649.1.1
ID No. B-2532
County: Craven

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
RW-1	SS-1	100	98	2	21.4	77.8	0.8	0.0	15	NP	A-3(0)	13.6-15.1		
	SS-2	97	93	38	12.8	54.8	17.2	15.2	18	4	A-2-4(0)	23.6-25.1		
RW-4	SS-3	60	49	15	34.0	44.6	13.8	7.6	32	NP	A-1-b(0)	4.0-5.5		
	SS-4	53	43	23	25.0	45.2	20.2	9.6	26	NP	A-1-b(0)	13.6-15.1		
RW-3	SS-5	46	39	19	26.4	40.8	17.6	15.2	29	NP	A-1-b(0)	8.6-10.1		
	SS-6	99	96	17	10.6	77.6	4.2	7.6	21	NP	A-2-4(0)	13.6-15.1		
	SS-7	53	41	31	30.2	19.8	22.4	27.6	50	12	A-2-7(1)	18.6-20.1		
RW-2	SS-8	100	31	2	87.0	11.2	0.2	1.6	21	NP	A-1-b(0)	3.9-5.4		
	SS-9	99	94	13	17.8	72.6	6.0	3.6	14	NP	A-2-4(0)	18.4-19.9		
RW-5	SS-10	99	34	2	84.0	14.8	1.2	0.0	17	NP	A-1-b(0)	3.7-5.2		
	SS-11	47	39	11	28.0	52.4	12.4	7.2	33	NP	A-1-b(0)	8.1-9.6		
RW-7	SS-12	79	60	10	56.0	32.6	5.8	5.6	19	NP	A-3(0)	4.0-5.5		
	SS-13	45	45	38	6.2	13.2	63.0	17.6	53	9	A-5(6)	13.6-15.1		
	SS-14	96	94	35	4.0	67.0	17.4	11.6	27	NP	A-2-4(0)	18.6-20.1		
RW-8	SS-15	100	96	17	13.6	74.0	4.8	7.6	18	NP	A-2-4(0)	8.6-10.1		

PROJECT: 32649.1.1 ID: B-2532

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2532	1	61
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
32649.1.1	N/A	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 32649.1.1 I.D. NO. B-2532

F.A. PROJECT N/A

COUNTY CRAVEN

PROJECT DESCRIPTION BRIDGE No. 60 OVER THE TRENT RIVER ON US 70 BUSINESS

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 ENGINEERING 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.

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Structure Design

INVESTIGATED BY S&ME, INC. PERSONNEL S. JOHNSON

CHECKED BY A.F. RIGGS, JR. A. NASH

SUBMITTED BY S&ME, INC. N. BRADLEY

DATE DECEMBER 2, 2005 A. MARTIN

M. MOSELEY

Jo. WHITE

J. WALKER

Ja. WHITE

P. PHELPS

T. PEREZ

DRAWN BY: T. PERez

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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 PROFESSIONAL SEAL 14155 ENGINEER ABNER F. RIGGS, JR. SEAL

12/16/05

SIGNATURE Abner F Riggs

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-2532	32649.1.1	2	61

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING 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
- HC - HOLE CAVE
- 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
- WATER LOSS
- SPT / DPT / VST / PMT - TEST BORING
- CPT TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- SPT TEST SAMPLE

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:
- [x] MOBILE B- 57
- [ ] BK-51
- [x] CME-45C
- [ ] CME-750
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

ADVANCING TOOLS:
- [ ] DRAG BITS _____
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [x] CASING [ ] W/ ADVANCER
- [x] TRICONE 2-15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [ ] AUTOMATIC [x] MANUAL

CORE SIZE:
- [ ] -B_____
- [x] -N WD4
- [ ] -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 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: NCDOT Traverse Station Rebar & Cap Stamped "B2532-1"
Located at Station 11+80.66 -BL-
ELEVATION: 10.43'

BENCH MARK: RR Spike in SW Corner of Paved Parking Area in NW Quadrant of Front St. and Tryon Palace Dr. Intersection Located at Station 38+16 -BL-.
ELEVATION: 5.82'

NOTES:

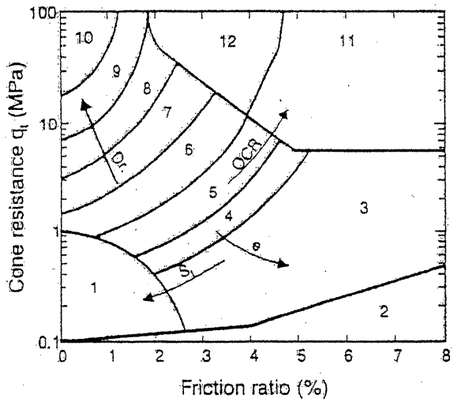
ADDITIONAL SOIL/ROCK DESCRIPTIONS

- SILTY COARSE TO FINE SAND (A-2-4) WITH FRIABLE THINLY BEDDED SANDY LIMESTONE LAYERS
- SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE TO INDURATED VERY THINLY TO THICKLY BEDDED SANDY LIMESTONE LAYERS
- FRIABLE TO MODERATELY INDURATED THINLY BEDDED SANDY LIMESTONE WITH THIN FINE TO COARSE SAND LAYERS

REVISED 09/15/00

CPT Soil Profiling and Classification [1]

Soil samples are not recovered during CPT testing; however, it is possible to obtain an approximate soil classification using from cone resistance q_c and friction ratio R_f. Literature has shown that q_c is relatively high in sands and low in clays. Further, R_f is relatively low sands and high in clays. Soil types based on CPT results are usually referred to as soil behavior type (SBT). Soil classification charts have been adapted and improved based on expanded databases. One of the most commonly used behavior type charts, Figure 1, is suggested by Robertson (1986). Using q_c and R_f, this chart gives reasonable predictions of soil behavior up to 60 feet in depth.



Zone	Soil behaviour type
1	Sensitive fine grained
2	Organic material
3	Clay
4	Silty Clay to clay
5	Clayey silt to silty clay
6	Sandy silt to clayey silt
7	Silty sand to sandy silt
8	Sand to silty sand
9	Sand
10	Gravelly sand to sand
11	Very stiff fine grained*
12	Sand to clayey sand*

* Overconsolidated or cemented

Figure 1: Soil behavior type classification chart (after Robertson, 1986)

Since both penetration resistance and sleeve friction increase with depth due to the increase of effective overburden stress (σ_{v0}), CPT data requires correction (normalization). Robertson (1990) developed a normalized CPT soil behavior chart, Figure 2, using normalized friction ratio, R_f, and normalized cone resistance, Q_t.

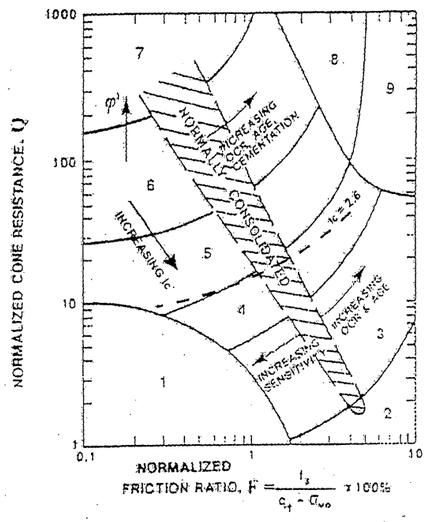
$$F_r = \left[f_{sc}/\left(q_c - \sigma_{v_0}\right)\right]\times 100 \qquad Q_t = \left(q_c - \sigma_{v_o}\right)/\sigma'_{v_0}$$

The Equivalent Soil Description for the CPT boring logs were based on correlations with the above soil behavior type classification chart using CPT data, visual field classification, and laboratory test results. The soils obtained from adjacent SPT soil test, auger probe, and geoprobe borings were visually classified and verified in the laboratory using the AASHTO soil classification system. These were correlated with the CPT data and presented on the CPT boring logs and profiles.

[1] Jefferies, M. G. and Davies M. P. (1993), "Use of CPT to Estimate Equivalent SPT N_{60}", Geotechnical Testing Journal , Philadelphia, Pennsylvania.

Robertson, P. K. (1989) "Soil Classification using Cone Penetration Test", Canadian Geotechnical Journal, Edmonton, Alberta.

Robertson, P. K. (1998) "Cone Penetration Testing for Geotechnical and Environmental Site Investigation", ConeTec Inc.



Zone	Soil Behaviour Type	I_c
1	Sensitive, fine grained	N/A
2	Organic soils – peats	> 3.6
3	Clays – silty clay to clay	2.95 – 3.6
4	Silt mixtures – clayey silt to silty clay	2.60 – 2.95
5	Sand mixtures – silty sand to sandy silt	2.05 – 2.6
6	Sands – clean sand to silty sand	1.31 – 2.05
7	Gravelly sand to dense sand	< 1.31
8	Very stiff sand to clayey sand*	N/A
9	Very stiff, fine grained*	N/A

* Heavily overconsolidated or cemented

Figure 2: Normalized soil behavior type classification chart (after Robertson, 1990)

Note the charts are based on a broad sampling and are not regionally specific. Overlap in some zones should be expected and adjusted based on local experience.

Proposed by Jeffries and Davies (1993), the following equation combines the normalized cone parameters into a soil behavior type index, I_c.

$$I_c = \left(\left(3.47 - \log Q_T\right)^2 + \left(\log F_r + 1.22\right)^2\right)^{0.5}$$

Collecting additional parameters such as the pore water pressure during testing improves soil classification.

Correlation between CPT Data and SPT N_{60}

Standard penetration test (SPT) N-values can be correlated to CPT cone penetration resistance, q_c. The following equation was developed by Jeffries and Davies (1993):

$$\frac{\left(q_c/P_a\right)}{N_{60}} = 8.5\left(1 - \frac{I_c}{4.6}\right)$$

Where I_c is the aforementioned soil behavior type index and q_c is normalized by P_a (atmospheric pressure). Corrections for the grain size influence are included in the equation.

STATE PROJECT NO.: 32649.1.1
I.D. NO.: B-2532
FEDERAL PROJECT NO.: N/A
COUNTY: Craven

DESCRIPTION: Bridge No. 60 on Over Trent River on US 70 Business

SUBJECT: Structure Subsurface Investigation – Inventory Report

Project Description

The project site is located on US 70 Business just south of New Bern and north of the elevated US 70 Bypass/ US 70 Business interchange in Craven County, North Carolina at the crossing of the Trent River (See Site Vicinity Map, Sheet 6). The proposed project consists of a replacement bridge structure. Based on the Preliminary General Drawings, the center of the proposed bascule will be at Station 32+21.39 along the -L- survey line. The new bridge structure will have a clear roadway width of 45 feet. The new bridge structure will be approximately 1762 feet and 5 inches long with the bents constructed on a skew angle of 90° to the -L- survey line. The new bridge structure will consist of nineteen spans with lengths of 1 at 94 feet 7 inches, 6 at 93 feet 8.5 inches, 5 at 90 feet 6 inches, 2 at 93 feet 3.5 inches, 1 at 166 feet (bascule span), 1 at 71 feet, 2 at 71 feet 2.5 inches and 1 at 72 feet 1 inch. The structure will have twenty bents (two end bents and eighteen interior bents).

Based upon the Preliminary General Drawings provided by NCDOT, the finished grade elevations for the new bridge structure will be approximately elevation 13 feet at the south approach and approximately elevation 14 feet at the north approach. The center line of the replacement bridge structure will be located approximately 1.75 feet east the center of the existing structure. Earthwork is anticipated at the approaches and the new shoulders will be benched into the existing embankment. Fill depths on the order of 9 to 10 feet are anticipated, above the flood plain, along the shoulders at the north and south approaches. In addition, the existing fill slopes will be cut back and reworked at the end bents to a slope of 1.5:1 (horizontal to vertical) and Class II Rip-Rap erosion protection will be placed.

A geotechnical investigation was conducted between October 26 and November 29, 2005. Boring B13-B was offset approximately 40 feet right of the existing bridge due to fiber optic lines, electric cables associated with the swing span of the bridge located along the river bottom. Boring B14-A was offset approximately 35 feet left of the existing bridge due to the electric cables located on the river bottom and a buried water line located outside of the fender system. Borings were not performed on the opposite sides of Interior Bents 13 and 14 due to the rotation of the swing span of the bridge. Boring BTP-1 was drilled in the vicinity of the test pile driven by NCDOT. Borings EB1-B and EB2-A were drilled within the existing roadway on roadway embankment fill. Borings B1-A, B2-B, B3-A, B4-B, B5-A, B6-B, B9-A, B15-A, B16-B and B18-B were drilled from the existing bridge deck, in the river channel, and borings B7-A, B8-B, B10-B, B11-A, B12-A, B13-B, B14-A, B17-B and BTP-1 were drilled from a shallow draft barge in the river channel (See Site Plan, Sheets 7 and 8). In addition to soil test borings, six Cone Penetration Test (CPT) soundings were pushed November 16 and 17, 2005 at locations shown on the Boring Location Plan (See Site Plan, Sheets 7 and 8) with a truck mounted CPT rig. CPT-1 through CPT-5 were pushed through previously cored holes in the bridge deck, in the river channel and CPT-6 was pushed along the roadway shoulder on roadway embankment fill. All land borings and borings drilled from the existing bridge deck were performed with a Mobile B-57 drill rig or BK-51 drill rig mounted on an all-terrain carrier. All water borings were drilled with a CME-45c mounted on the S&ME's shallow draft barge. Representative soil samples were collected for visual classification in the field and for laboratory classification analysis by the NCDOT accredited S&ME soil testing laboratory. No Shelby tube sample was obtained from the river channel to perform Erosion Function Apparatus testing due to non-cohesive materials and organic materials located at the surface. Traffic Control Safety Services provided traffic control during drilling operations.

Physiography and Geology

The project site is located south of New Bern at the crossing of US 70 Business over the Trent River where the Trent River flows into the Neuse River in Craven County, North Carolina. The existing bridge structure is approximately 1762 feet 5 inches long and approximately 33 feet wide. The existing bridge is situated within the flood plain of the Trent River along a two lane paved road (US 70 Business) and consists of a reinforced concrete deck overlain with asphalt on steel I-beams supported on reinforced concrete pile caps and pre-stressed 22 inch octagonal concrete piles. US 70 Business runs approximately north and south and has roadway embankment shoulders. The flood plain extends approximately 500 feet on the north side of the river and approximately 1500 feet on the south side of the river and consists mainly of commercial development. A marina is located southwest of the existing bridge and Union Point Park is located northeast of existing bridge. The Convention Center is located immediately northwest of the existing bridge. A water line was bored beneath the river bed and varies from approximately 30 to 50 feet west of the existing bridge. A fiber optic cable is attached beneath the right side of the exiting bridge, then goes along the river bottom around the right side of the finder system at the channel crossing. Electric cables associated with the swing span, signals and gates are attached beneath the existing bridge and also run beneath and adjacent to the bridge from the bridge tender house to the opposite side of the channel. Underground utilities including fiber optic cables, water and power are located along the roadway shoulders at the north and south approaches.

The site is located within the eastern portion of the Coastal Plain Physiographic and Geologic Province of North Carolina in Craven County. The Coastal Plain Province is typically characterized by marine and eolian sediments that were deposited during the transgressive and regressive depositional sequences of the ocean moving into and out of North Carolina. As such, the Coastal Plain Province is characterized by subdued topographic features and flat, low-lying terrain. The geology of the southeastern portion of Craven County, near the project site, primarily consists of recent alluvial sediments underlain by Coastal Plain Deposits of the James City, Yorktown, Belgrade and River Bend Formations. Typically, the alluvium consists of gray silty coarse to fine sands and fine sandy silts. The alluvium is underlain by the James City Formation and Yorktown Formations to the south above the Belgrade Formation. The James City Formation and Yorktown Formation are characterized by dissolved shell material and appears to have been eroded away to the north and main river channel of the Trent River. The surface of the Belgrade Formation is irregular and appears to have been eroded with several paleo channels. The Belgrade Formation consists of tan to gray sands and thinly bedded indurated sandy limestone. The Belgrade Formation is underlain by the River Bend Formation. The surface of the River Bend Formation appears to be relatively uniform. The River Bend Formation typically consist of gray moldic limestone with sand layers.

Foundation Materials

The borings were advanced to depths ranging from 66.5 to 109.6 feet (elevations -64.4 to -125.5 feet) at collar elevations ranging from 11.0 to -16.4 feet.

Roadway embankment fill materials were encountered in borings EB1-B and EB2-A to depths of about 8.0 to 12.0 feet (elevations 2.6 to -1.5 feet) below the collar elevation. The fill material encountered in these borings consists of medium dense to loose gray slightly silty clayey fine to coarse sand (A-2-4) and medium dense tan-brown fine to coarse sand (A-1-b) with trace of silt. Standard penetration test (SPT) N-values in the fill materials ranged from 9 to 19 blows per foot (bpf).

Alluvial deposits were encountered beneath the embankment fill materials in borings EB1-B and EB2-A and in the river channel in the remaining borings to depths ranging from about 11.0 to 42.0 feet (elevations -11.0 to -42.6 feet) beneath collar elevations. Typically, alluvial deposits encountered consist of very loose to dense gray, dark gray and brown silty fine to coarse sand (A-3, A-2-4, A-1-b) with trace of shell material, limestone fragments and little to trace amounts of organic matter, very soft to medium stiff brown and gray clayey fine sandy silt (A-4), very loose brown highly organic fine sand (Muck) and very soft black-brown highly organic fine sandy silt (Muck). The standard penetration test (SPT) N-values for the alluvial soils ranged from Weight of Hammer (WOH) to 45 bpf.

Soils of the James City Formation were encountered beneath the alluvial deposits in boring EB1-B to a depth of about 26.0 feet (elevation -15.0 feet) beneath the collar elevation. The James City Formation consists of stiff brown fine sandy silt (A-4) with trace of shell material. The standard penetration test (SPT) N-value for the James City Formation is 11 bpf.

Soils of the Yorktown Formation were encountered beneath the James City Formation in boring EB1-B and beneath the alluvium in borings B1-A and B2-B to depths ranging from about 17.0 to 32.6 feet (elevations -20.4 to -25.4 feet) beneath the collar elevation. The Yorktown Formation consists of stiff gray fine sandy silt (A-4) with trace of shell material. The standard penetration test (SPT) N-values for the Yorktown Formation soils ranged from 12 to 14 bpf.

Beneath the Yorktown Formation in borings EB1-B, B1-A and B2-B and beneath the alluvium in the remaining borings, the Belgrade Formation was encountered at depths ranging from about 17.0 to 42.0 feet (elevations -20.4 to -42.6 feet) beneath collar elevations and extended to depths ranging from about 43.8 to 72.0 feet (elevations -57.2 to -65.3 feet) beneath collar elevations. The Belgrade Formation consist of medium dense to very dense gray-tan silty fine to coarse sands (A-3, A-2-4, A-1-b) with trace of friable to indurated thinly bedded gray and tan sandy limestone layers, medium dense to dense gray and tan silty fine to coarse sand (A-1-b) with friable to indurated thinly to thickly bedded gray and tan sandy limestone layers and friable to indurated thinly to thickly bedded gray-tan sandy limestone with trace of thin sand layers. The standard penetration test (SPT) N-values for the Belgrade Formation ranged from 12 bpf to 100 blows per 0.8 feet of penetration.

The River Bend Formation was encountered beneath the Belgrade Formation in all of the borings at depths ranging from about 43.8 to 72.0 feet (elevations -57.2 to -65.3 feet) beneath collar elevations and extended to boring termination. Soils and rock encountered within the River Bend Formation consist of friable to extremely indurated very thinly to thickly bedded gray moldic limestone with trace of thin sand layers, dense gray silty fine to coarse sand (A-1-b) with indurated thinly bedded moldic limestone layers, very dense gray silty fine to coarse sand (A-1-b) with friable to indurated thinly bedded gray sandy limestone layers and medium dense to very dense gray silty fine to coarse sand (A-2-4). The N-values within the River Bend Formation ranged from 28 to 60 blows with no penetration.

A NWD4 split core barrel was advanced in borings B3-A, B7-A, B11-A, B13-B, B14-A and B17-B to evaluate limestone in the Belgrade and River Bend Formations. Coring activities recovered 0 to 100 percent of the total core run. Recoveries of 13% to 94% were common with higher percent recoveries typical of the limestone encountered within the River Bend Formation.

Notes to Designer

The Mobile B-57 and CME-45c drill rigs are equipped with a manual hammer. Standard Penetration tests were performed with a traditional rope, cathead and Safety Hammer. The BK-51 drill rig is equipped with a hydraulic automatic hammer. Standard Penetration tests were performed with the attached Autohammer and not with a traditional rope, cathead and Safety Hammer.

Cone Penetration Testing[1]

The cone penetration test (CPT) consists of hydraulically pushing a metal cone of specific dimensions into the ground. The CPT borings were performed using an integrated electronic cone system. The cone method used was designed in accordance with ASTM D 3341-94 having a tip area of 15 cm^2 and a sleeve friction area of 230 cm^2. The peizometer element consists of a 5 mm plastic porous element located immediately behind the cone tip. The cone utilized during this exploration is capable of measuring tip resistance, sleeve friction and dynamic pore pressures. Soil resistance at the cone tip and sleeve are measured by electronic sensors. The cone resistance, q_c, is the total force acting on the cone divided by the projected area of the cone; and the side friction, f_{sc}, is the total frictional force acting on the sleeve divided by its surface area. Data is typically expressed in terms of the friction ratio, R_f (f_{sc}/q_c x 100). Tip and sleeve values can be used to estimate soil properties and soil classification. Additional sensors can measure changes in pore pressure within the soil caused by the penetration of the cone. Pore pressures dissipation measurements were conducted at internals, which were noted to have an increase in the in-situ pore pressure during the real time soil property measurements of the cone.

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[1] Jefferies, M. G. and Davies M. P. (1993), "Use of CPT to Estimate Equivalent SPT N_{60}", Geotechnical Testing Journal , Philadelphia, Pennsylvania.

Robertson, P. K. (1989) "Soil Classification using Cone Penetration Test", Canadian Geotechnical Journal, Edmonton, Alberta.

Robertson, P. K. (1998) "Cone Penetration Testing for Geotechnical and Environmental Site Investigation", ConeTec Inc.

Groundwater

Groundwater depths were not measured at the time of drilling operations since mud rotary drilling procedures were used. Borings EB1-B and EB2-A, performed within the existing roadway, were filled at completion of drilling due to safety concerns. The remaining borings were performed with the river channel. The river level at the time of our field investigation was elevation -0.1 feet on November 11, 2005. Loss of drilling fluid was observed in most of the borings at depths of 43.8 to 72.0 feet (elevations -65.3 feet to -57.2 feet) beneath the collar elevations.

QUALIFICATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions contained in this report were based on the applicable standards of our profession at the time this report was prepared. No other warranty, expressed or implied, is made.

The conclusions submitted in this report are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of subsurface variations between the borings may not become evident until construction. If variations appear evident, then the conclusions contained in this report may need to be re-evaluated. In the event that any changes in the nature, design, or location of the structure are planned, the conclusions contained in this report will not be considered valid unless the changes are reviewed by S&ME, and the conclusions of the report are modified or verified in writing.

S&ME appreciates the opportunity to be your geotechnical consultant on this project. If you have any questions or need additional information in regard to this report, please contact us.

Very truly yours,
S&ME, Inc.

J. Shane Johnson, P.G.
Project Geologist
N.C. Registration No. 1753

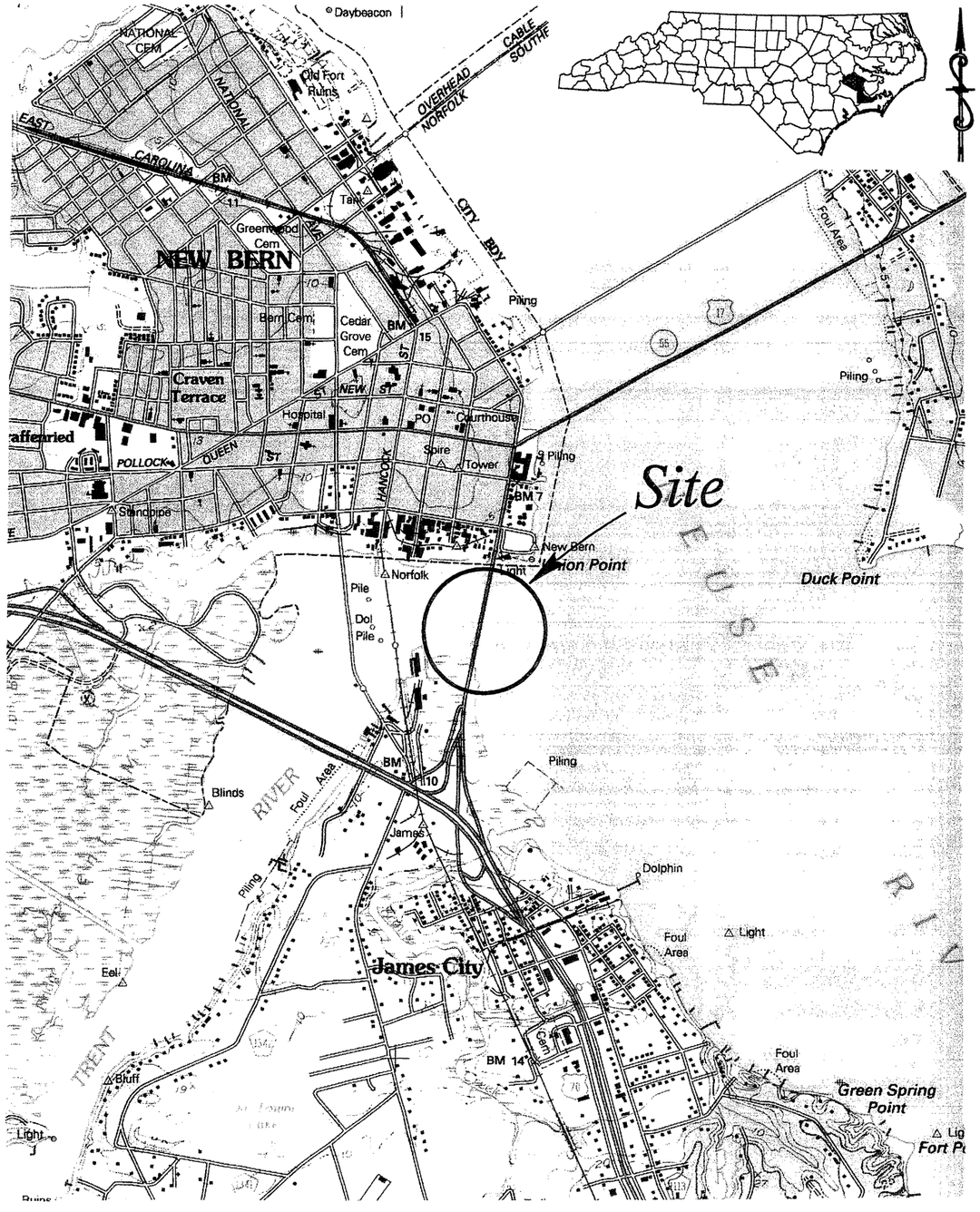
Abner F. Riggs, Jr. P.E.
Chief Geotechnical Engineer
N.C. Registration No. 14155

NORTH CAROLINA PROFESSIONAL SEAL 14155 12/16/05 ENGINEER ABNER F. RIGGS, JR.

Attachments

PROJECT: 32649.1.1 ID: B-2532

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-2532	32649.1.1	6	61



SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	DECEMBER 2005
JOB NO.	1051-05-478

SITE VICINITY MAP

BRIDGE No. 60
OVER THE TRENT RIVER ON US 70 BUSINESS
STATE PROJECT NO. 32649.1.1 TIP NO. B-2532
FEDERAL I.D. NO. BRSTP-070B(4)
CRAVEN COUNTY, NORTH CAROLINA

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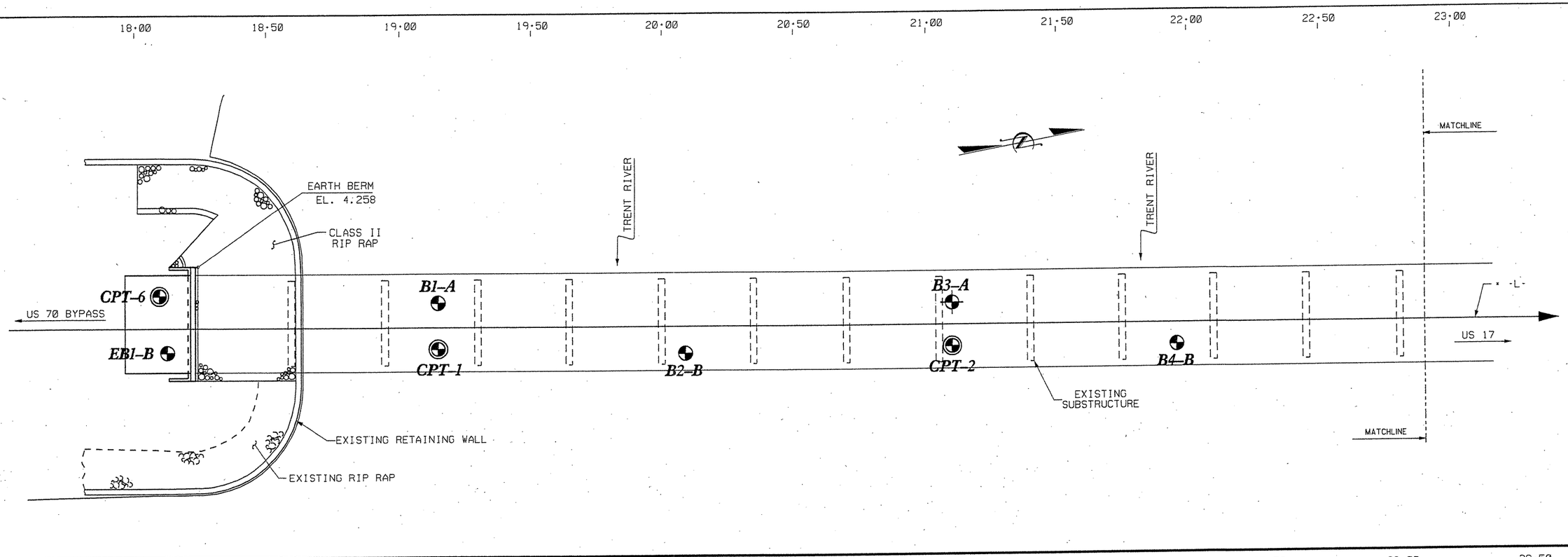

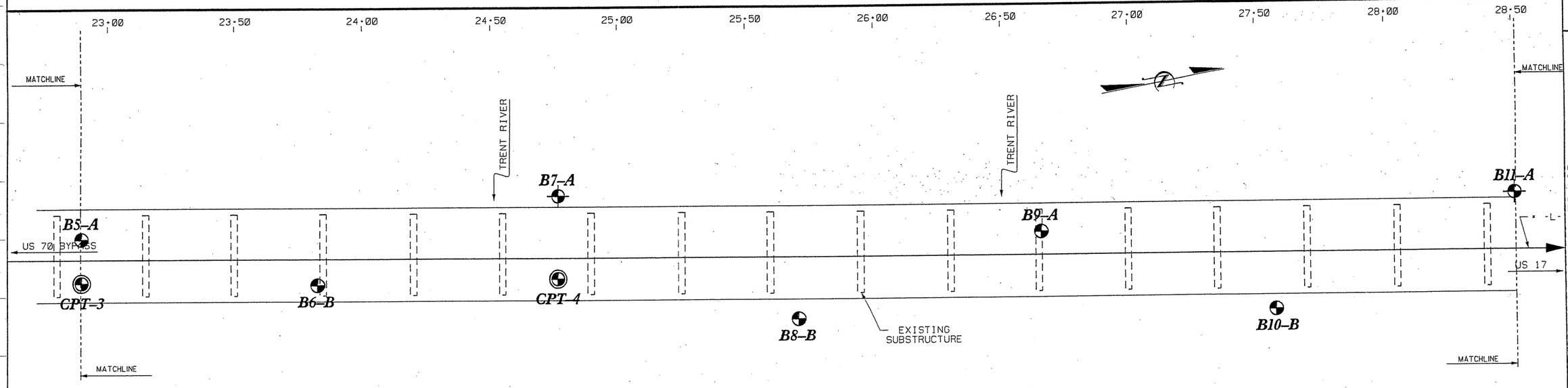

BENCHMARK:
NCDOT TRAVERSE STATION REBAR & CAP STAMPED "B2532-1"
LOCATED AT STA 11+80.66 -BL- ELEV. 10.43'
and
RR SPIKE IN SW CORNER OF PAVED PARKING AREA
IN NW QUADRANT OF FRONT ST. AND TRYON PALACE DR. INTERSECTION
LOCATED AT STATION 38+16 -BL- ELEV. 5.82'

SKEW ANGLE FOR BENTS 90° 00' 00" (TYPICAL)

NEUSE RIVER

NEUSE RIVER

0 40 80
SCALE IN FEET

APPROVED BY: AFR
DRAWN BY: TRP
SHEET 7 OF 61
SCALE: 1" = 40'
DATE: DECEMBER 2005
JOB NO. 1051-05-478

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

BORING LOCATION PLAN

BRIDGE No. 60
OVER THE TRENT RIVER ON US 70 BUSINESS
STATE PROJECT No. 32649.1.1 TIP No. B-2532 FEDERAL I.D. BRSTP-070B(4)
CRAVEN COUNTY, NORTH CAROLINA

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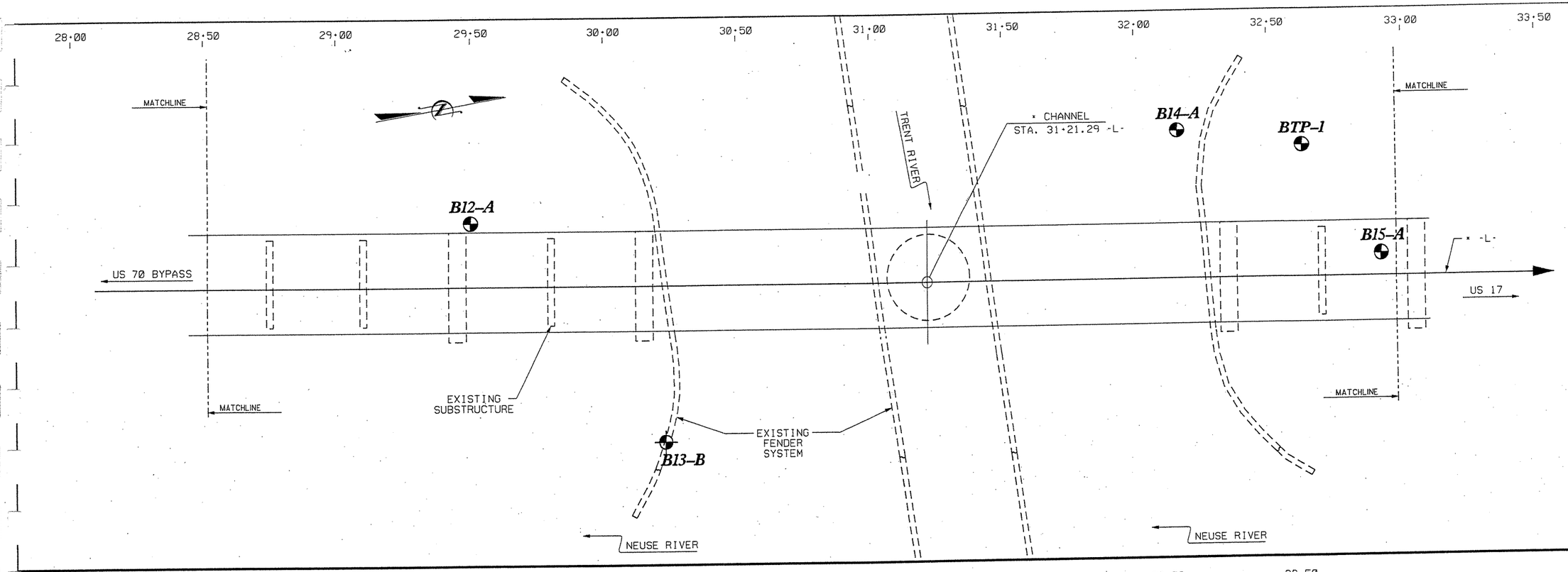

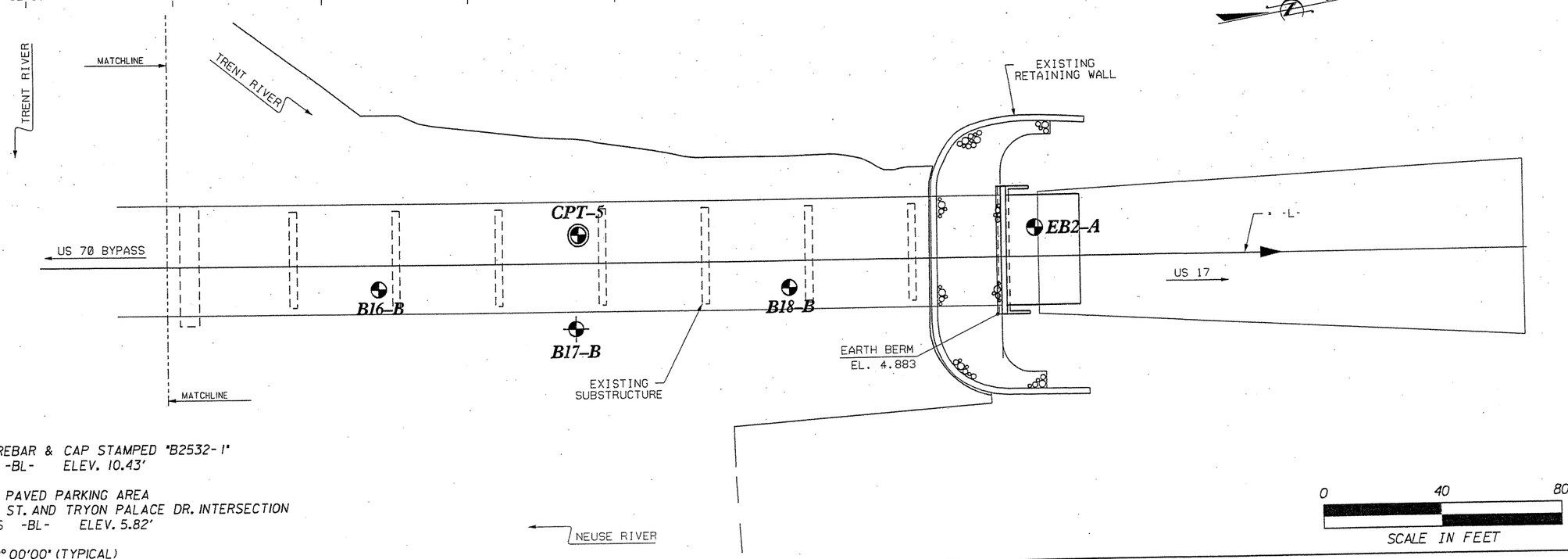

BENCHMARK:
NCDOT TRAVERSE STATION REBAR & CAP STAMPED "B2532-1"
LOCATED AT STA 11+80.66 -BL- ELEV. 10.43'
and
RR SPIKE IN SW CORNER OF PAVED PARKING AREA
IN NW QUADRANT OF FRONT ST. AND TRYON PALACE DR. INTERSECTION
LOCATED AT STATION 38+16 -BL- ELEV. 5.82'

SKEW ANGLE FOR BENTS 90°00'00" (TYPICAL)

S:\PROJECTS\2005\05-178\GEOTECH\CADD\B-2532 SITEPLAN

APPROVED BY: AFR
DRAWN BY: TRP
SHEET 8 OF 61

SCALE: 1" = 40'
DATE: DECEMBER 2005
JOB NO. 1051-05-478

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING TESTING

BORING LOCATION PLAN

BRIDGE No. 60
OVER THE TRENT RIVER ON US 70 BUSINESS
STATE PROJECT No. 32649.1.1 TIP No. B-2532 FEDERAL I.D. BRSTP-070B(4)
CRAVEN COUNTY, NORTH CAROLINA

S:\PROJECTS\2005\05-478\CAD\B-2532 PROFILE

GENERALIZED SUBSURFACE PROFILE ALONG -L-

TO 70 BYPASS

TO US 17

GROUND SURFACE

RIVER BOTTOM

EB1–B	B1–A	B2–B	B3–A
18+13	19+15	20+09	21+10
9ft RT –L–	9ft LT –L–	10ft RT –L–	8ft LT –L–

W.L. = 0.1' TV1105

ROADWAY EMBANKMENT FILL: MEDIUM DENSE TO LOOSE GRAY SLIGHTLY SILTY CLAYEY FINE TO COARSE SAND (M)

ALLUVIUM: VERY LOOSE TO MEDIUM DENSE BROWN, GRAY AND TAN SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS (SAT.)

ALLUVIUM: VERY LOOSE TO MEDIUM DENSE DARK GRAY SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL (SAT.)

JAMES CITY FORMATION: STIFF BROWN FINE SANDY SILT WITH TRACE OF SHELL MATERIAL (W)

YORKTOWN FORMATION: STIFF GRAY FINE SANDY SILT WITH TRACE OF SHELL MATERIAL (W)

BELGRADE FORMATION: MODERATELY INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS (SAT.)

MEDIUM DENSE TO DENSE GRAY AND TAN FINE TO COARSE SAND WITH FRIABLE TO INDURATED VERY THINLY TO THINLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

FRIABLE TO INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SANDY LAYERS (SAT.)

RIVER BEND FORMATION: FRIABLE TO EXTREMELY INDURATED VERY THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SANDY LAYERS (SAT.)

C ALLUVIUM: VERY SOFT TO MEDIUM STIFF BROWN AND GRAY CLAYEY FINE SANDY SILT WITH TRACE OF ORGANIC MATTER (W)

D ALLUVIUM: VERY LOOSE BROWN SILTY FINE TO COARSE SAND WITH TRACE OF LIMESTONE FRAGMENTS (SAT.)

E BELGRADE FORMATION: FRIABLE TO INDURATED THINLY TO THICKLY BEDDED TAN, GRAY SANDY LIMESTONE WITH TRACE OF SAND LAYERS (SAT.)

F BELGRADE FORMATION: MEDIUM DENSE TO VERY DENSE GRAY-TAN SLIGHTLY SITLEY FINE TO COARSE SAND WITH TRACE OF FRIABLE TO INDURATED THINLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

Vertical 0 20'

Horizontal 0 50'

17+00 17+50 18+00 18+50 19+00 19+50 20+00 20+50 21+00

GENERALIZED SUBSURFACE PROFILE ALONG -L-

STATION 17+00 TO 21+00

REPLACEMENT OF BRIDGE No. 60
OVER TRENT RIVER ON US 70 BUSINESS
TIP No. B-2532 STATE PROJECT No. 32649.1.1 FEDERAL I.D. BRSTP-070B (4)
CRAVEN COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	DECEMBER 2005	DRAWN BY:	TRP
JOB NO.	1051-05-478	FIGURE	9 OF 61

S:\PROJECTS\2005705-4187\CAD\B-2532 PROFILE

GENERALIZED SUBSURFACE PROFILE ALONG -L-

TO 70 BYPASS

TO US 17

B4–B
21+96
8ft RT –L–

B5–A
22+90
8ft LT –L–

B6–B
23+88
10ft RT –L–

B7–A
24+77
24ft LT –L–

W.L. = 0.1'
11/1/05

RIVER BOTTOM

ALLUVIUM: VERY LOOSE TO MEDIUM DENSE BROWN, GRAY AND TAN SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS (SAT.)

ALLUVIUM: VERY SOFT DARK BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK) (W)

ALLUVIUM: VERY LOOSE BROWN SLIGHTLY SILTY FINE SAND WITH LITTLE ORGANIC MATTER (SAT.)

ALLUVIUM: VERY LOOSE TO MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS (SAT.)

BELGRADE FORMATION: MEDIUM DENSE TO DENSE GRAY AND TAN SILTY FINE TO COARSE SAND WITH FRIABLE TO INDURATED VERY THINLY TO THICKLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

FRIABLE TO INDURATED VERY THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS (SAT.)

RIVER BEND FORMATION: FRIABLE TO EXTREMELY INDURATED VERY THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SANDY LAYERS (SAT.)

A **ALLUVIUM:** VERY LOOSE BROWN HIGHLY ORGANIC FINE SAND (MUCK) (SAT.)

C **ALLUVIUM:** VERY SOFT TO MEDIUM STIFF BROWN AND GRAY CLAYEY FINE SANDY SILT WITH TRACE OF ORGANIC MATTER (W)

D **ALLUVIUM:** VERY LOOSE BROWN SILTY FINE TO COARSE SAND WITH TRACE OF LIMESTONE FRAGMENTS (SAT.)

F **BELGRADE FORMATION:** MEDIUM DENSE TO VERY DENSE GRAY-TAN SLIGHTLY SITLEY FINE TO COARSE SAND WITH TRACE OF FRIABLE TO INDURATED THINLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

G **BELGRADE FORMATION:** MEDIUM DENSE TO DENSE GRAY AND TAN SILTY FINE TO COARSE SAND WITH FRIABLE TO INDURATED VERY THINLY TO THICKLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

H **BELGRADE FORMATION:** DENSE GRAY SILTY FINE TO COARSE SAND WITH INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE LAYERS (SAT.)

Vertical 20′ / 10′

Horizontal 0 50′

21+00 21+50 22+00 22+50 23+00 23+50 24+00 24+50 25+00

GENERALIZED SUBSURFACE PROFILE ALONG -L-

STATION 21+00 TO 25+00
REPLACEMENT OF BRIDGE No. 60
OVER TRENT RIVER ON US 70 BUSINESS
TIP No. B-2532 STATE PROJECT No. 32649.1.1 FEDERAL I.D. BRSTP-070B (4)
CRAVEN COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
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SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	DECEMBER 2005	DRAWN BY:	TRP
JOB NO.	1051-05-478	FIGURE	10 OF 61

S:\PROJECTS\2005\05-4787\CADD\B-2532 PROFILE

GENERALIZED SUBSURFACE PROFILE ALONG -L-

TO 70 BYPASS

TO US 17

B8–B
25+71
24ft RT –L–

B9–A
26+66
9ft LT –L–

B10–B
27+58
22ft RT –L–

B11–A
28+51
22ft LT –L–

W.L.=0.1'
11/11/05

RIVER BOTTOM

ALLUVIUM: VERY SOFT DARK GRAY AND BROWN HIGHLY ORGANIC FINE SANDY CLAYEY SILT (W)

ALLUVIUM: VERY LOOSE TO MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS (SAT.)

ALLUVIUM: VERY LOOSE TO DENSE BROWN AND GRAY SILTY FINE TO COARSE SAND WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS (SAT.)

ALLUVIUM: SOFT GRAY CLAYEY SILT (W)

RIVER BEND FORMATION: FRIABLE TO EXTREMELY INDURATED VERY THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SANDY LAYERS (SAT.)

C ALLUVIUM: VERY SOFT TO MEDIUM STIFF BROWN AND GRAY CLAYEY FINE SANDY SILT WITH TRACE OF ORGANIC MATTER (W)

E BELGRADE FORMATION: FRIABLE TO INDURATED THINLY TO THICKLY BEDDED TAN, GRAY SANDY LIMESTONE WITH TRACE OF SAND LAYERS (SAT.)

F BELGRADE FORMATION: MEDIUM DENSE TO VERY DENSE GRAY-TAN SLIGHTLY SITLEY FINE TO COARSE SAND WITH TRACE OF FRIABLE TO INDURATED THINLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

G BELGRADE FORMATION: MEDIUM DENSE TO DENSE GRAY AND TAN SILTY FINE TO COARSE SAND WITH FRIABLE TO INDURATED VERY THINLY TO THICKLY BEDDED GRAY AND TAN SANDY LIMESTONE LAYERS (SAT.)

Vertical 20′ / 10′

Horizontal 0 50′

25+00 25+50 26+00 26+50 27+00 27+50 28+00 28+50 29+00

GENERALIZED SUBSURFACE PROFILE ALONG -L-

STATION 25+00 TO 29+00

REPLACEMENT OF BRIDGE No. 60
OVER TRENT RIVER ON US 70 BUSINESS
TIP No. B-2532 STATE PROJECT No. 32649.1.1 FEDERAL I.D. BRSTP-070B (4)
CRAVEN COUNTY, NORTH CAROLINA

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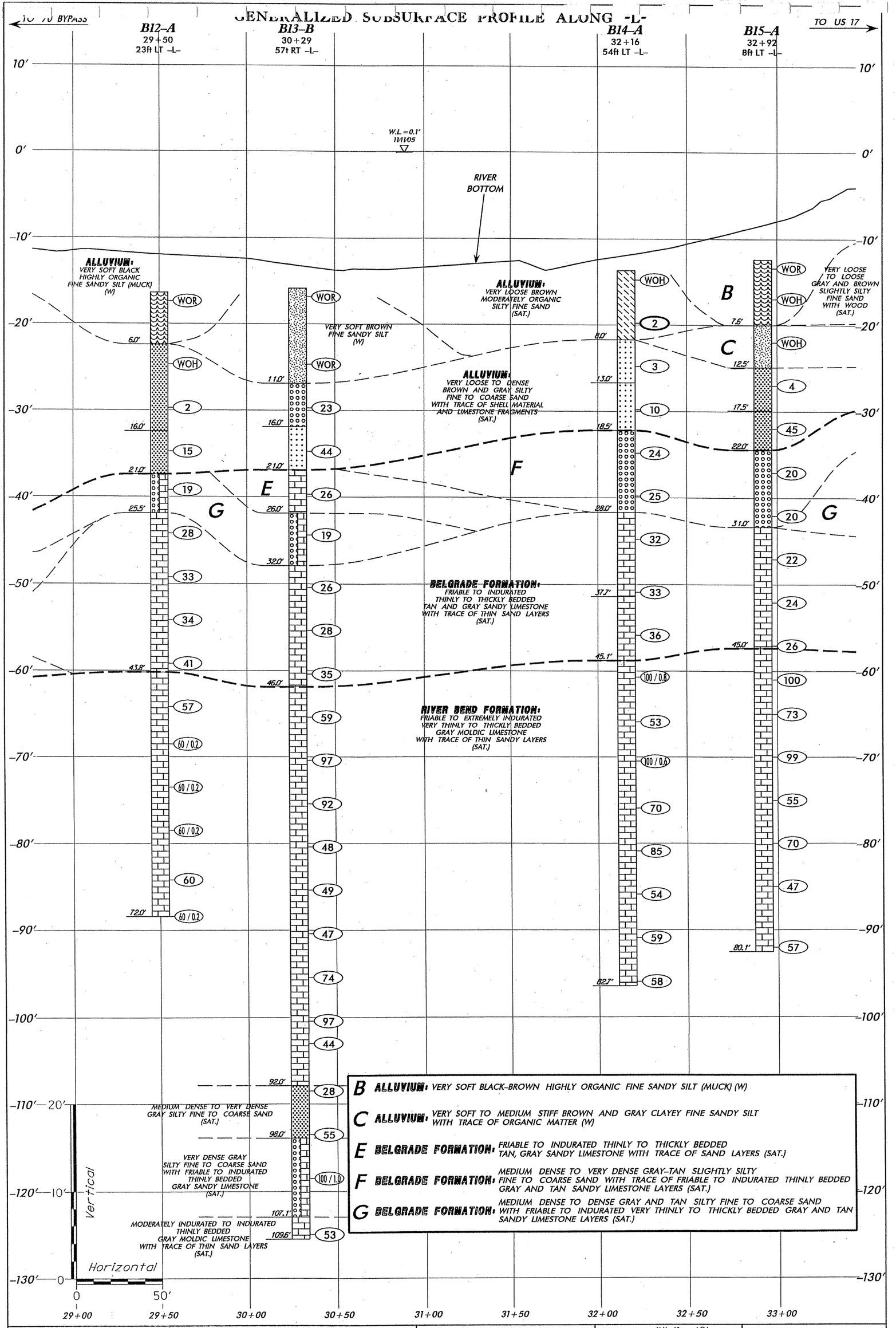
SCALE:	(V) 1" = 10′ (H) 1" = 50′	APPROVED BY:	AFR
DATE:	DECEMBER 2005	DRAWN BY:	TRP
JOB NO.	1051-05-478	FIGURE	11 OF 61

GENERALIZED SUBSURFACE PROFILE ALONG -L-



GENERALIZED SUBSURFACE PROFILE ALONG -L-

STATION 29+00 TO 33+00

REPLACEMENT OF BRIDGE No. 60
OVER TRENT RIVER ON US 70 BUSINESS
TIP No. B-2532 STATE PROJECT No. 32649.1.1 FEDERAL I.D. BRSTP-070B (4)
CRAVEN COUNTY, NORTH CAROLINA

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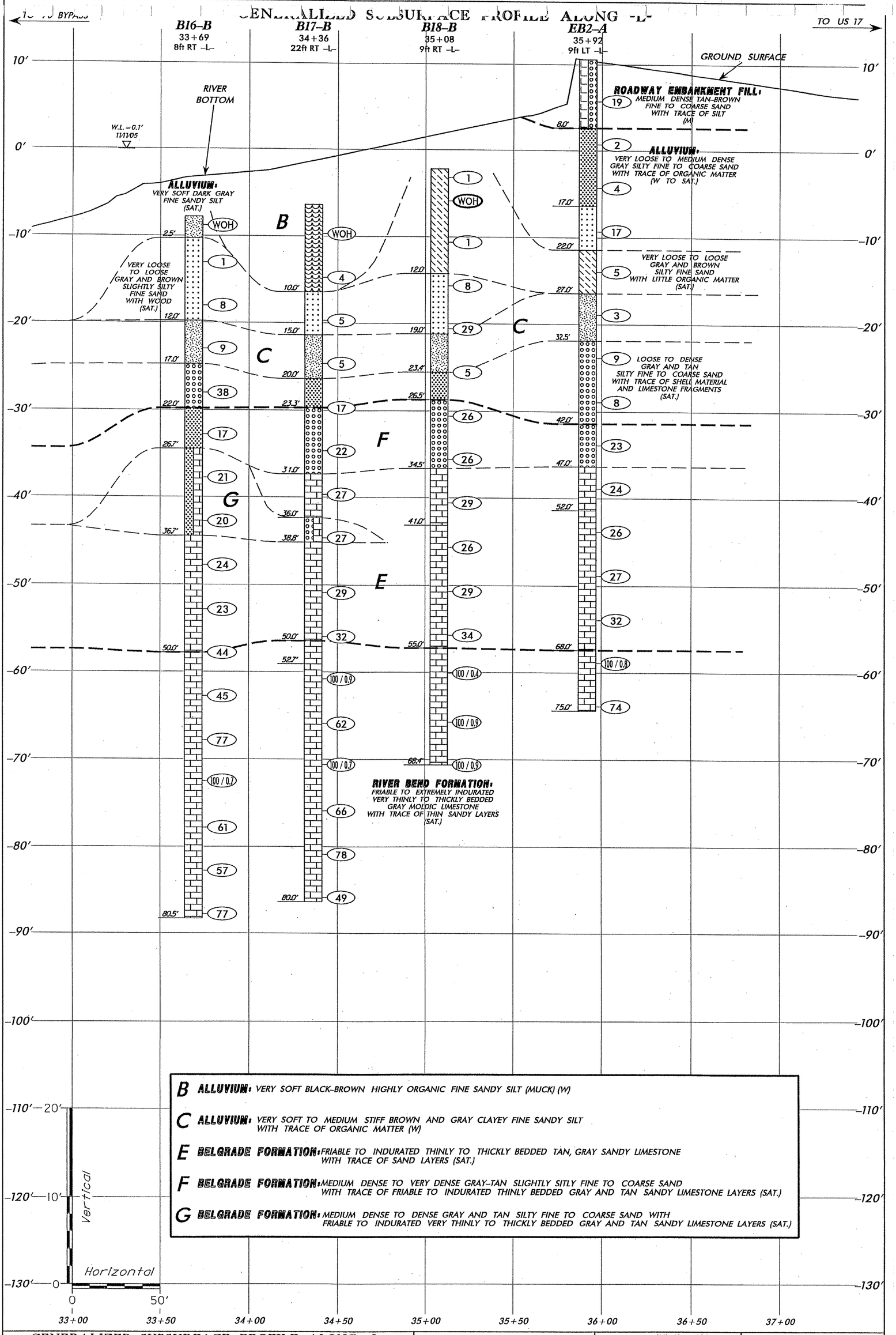
SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	DECEMBER 2005	DRAWN BY:	TRP
JOB NO.	1051-05-478	FIGURE	12 OF 61



GENERALIZED SUBSURFACE PROFILE ALONG -L-

STATION 33+00 TO 37+00

REPLACEMENT OF BRIDGE No. 60
OVER TRENT RIVER ON US 70 BUSINESS
TIP No. B-2532 STATE PROJECT No. 32649.1.1 FEDERAL I.D. BRSTP-070B (4)
CRAVEN COUNTY, NORTH CAROLINA

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

SCALE:	(V) 1" = 10' (H) 1" = 50'	APPROVED BY:	AFR
DATE:	DECEMBER 2005	DRAWN BY:	TRP
JOB NO.	1051-05-478	FIGURE	13 OF 61

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 18+13	**OFFSET** 9.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 11.0 ft	**NORTHING** 496,693.4	**EASTING** 2,586,907.4		**24 HR.** N/M
TOTAL DEPTH 79.0 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** 3-1/4" HSA/Rotary wash w/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/26/05	**COMPLETED** 10/26/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
11.0					ASPHALT PAVEMENT SURFACE				11.0 / 0.00
7.2	3.8	7	7	10	17		M		**ROADWAY EMBANKMENT FILL:** MEDIUM DENSE TO LOOSE GRAY SLIGHTLY SILTY CLAYEY FINE TO COARSE SAND (A-2-4)
2.2	8.8	7	5	4	9	SS-1	M		
-2.9	13.8	7	4	6	10		Sat.		-1.5 / 12.5 **ALLUVIUM:** LOOSE TO MEDIUM DENSE BROWN SILTY FINE TO COARSE SAND (A-1-b) WITH LITTLE SHELL MATERIAL
-7.9	18.8	4	8	8	16		Sat.		
-12.5	23.5	3	4	7	11		W		-11.0 / 22.0 **JAMES CITY FORMATION:** STIFF BROWN FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL
-17.5	28.5	7	6	7	13		W		-15.0 / 26.0 **YORKTOWN FORMATION:** STIFF GRAY FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL
-22.5	33.5	14	16	20	36		Sat.		-21.6 / 32.6 **BELGRADE FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-27.5	38.5	13	10	15	25		Sat.		
-32.5	43.5	60	40/0.3		100/0.8		Sat.		-36.0 / 47.0 VERY DENSE GRAY-TAN FINE TO COARSE SAND (A-1-b) WITH TRACE OF SILT
-37.5	48.5	31	38	25	63		Sat.		-41.0 / 52.0 MEDIUM DENSE TAN FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED THINLY BEDDED TAN SANDY LIMESTONE LAYERS
-42.5	53.5	12	13	14	27		Sat.		-46.0 / 57.0 DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED TO INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-47.5	58.5	16	31	16	47		Sat.		
-52.5	63.5	14	15	18	33		Sat.		
-57.5	68.5	15	18	17	35		Sat.		
-62.5	73.5	60/0.2			60/0.2				-61.0 / 72.0

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 18+13	**OFFSET** 9.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 11.0 ft	**NORTHING** 496,693.4	**EASTING** 2,586,907.4		**24 HR.** N/M
TOTAL DEPTH 79.0 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** 3-1/4" HSA/Rotary wash w/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/26/05	**COMPLETED** 10/26/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-63.8					Continued from previous page				
-67.5	78.5	100/0.5			100/0.5				BORING TERMINATED AT ELEV. -68.0 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE

-68.0 / 79.0 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*

1) ADVANCED 3-1/4" HSA TO 18.8 FEET.
2) ADVANCED 2-7/8" TRICONE ROLLER TO 78.5 FEET.
3) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) NO LOSS OF DRILLING FLUID OBSERVED.

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 1-A	**BORING LOCATION** 19+15	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. -1.9 ft	**NORTHING** 496,796.0	**EASTING** 2,586,907.6	**24 HR.** N/A
TOTAL DEPTH 81.9 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/1/05	**COMPLETED** 11/1/05	**SURFACE WATER DEPTH** 1.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.2					RIVER LEVEL		▽		
-1.9	0.0				RIVER BOTTOM				
		1	1	1	2	SS-2	Sat.		-1.9 **ALLUVIUM:** VERY LOOSE DARK GRAY COARSE TO FINE SAND (A-2-4) WITH TRACE OF SILT, CLAY AND SHELL MATERIAL 0.00
-7.0	5.1								-6.9
		13	5	6	11		Sat.		MEDIUM DENSE GRAY SLIGHTLY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS 5.0
-12.0	10.1								-10.9
		1	1	3	4		Sat.		LOOSE TAN SILTY FINE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS 9.0
-17.0	15.1								-15.9
		4	5	7	12		W		**YORKTOWN FORMATION:** STIFF DARK GRAY CLAYEY FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL 14.0
-22.3	20.4								-20.4
		13	8	10	18		Sat.		**BELGRADE FORMATION:** MEDIUM DENSE TAN SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN SANDY LIMESTONE LAYERS 18.5
-27.3	25.4								-30.9
		13	14	13	27		Sat.		VERY DENSE TAN-GRAY FINE SAND (A-3) WITH TRACE OF SILT 29.0
-32.3	30.4								-35.9
		22	38	62/0.4	100/0.9		Sat.		DENSE TO MEDIUM DENSE GRAY-TAN SLIGHTLY SILTY COARSE TO FINE SAND (A-3) WITH TRACE OF FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY-TAN SANDY LIMESTONE LAYERS 34.0
-37.3	35.4								
		11	15	18	33		Sat.		
-42.3	40.4								
		10	10	10	20		Sat.		-45.9
-47.3	45.4								MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS 44.0
		10	14	15	29		Sat.		-49.9
-52.3	50.4								FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS 48.0
		15	12	13	25		Sat.		
-57.3	55.4								
		16	12	13	25		Sat.		-60.9
-62.3	60.4								**RIVER BEND FORMATION:** FRIABLE TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS 59.0
		47	53/0.4		100/0.9		Sat.		
-67.3	65.4								
		64	36/0.3		100/0.8		Sat.		-70.9 69.0
-72.3	70.4								
		38	40	38	78		Sat.		

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 1-A	**BORING LOCATION** 19+15	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. -1.9 ft	**NORTHING** 496,796.0	**EASTING** 2,586,907.6	**24 HR.** N/A
TOTAL DEPTH 81.9 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/1/05	**COMPLETED** 11/1/05	**SURFACE WATER DEPTH** 1.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.0					Continued from previous page				
-77.3	75.4								
		22	25	22	47		Sat.		MODERATELY INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-82.3	80.4								
		45	37	22	59		Sat.		-83.8 81.9
					BORING TERMINATED AT ELEV. -83.8 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 15.1 FEET. 2) SET NW CASING TO 15.1 FEET (TEMP CASING 13.4 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER TO 80.4 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) NO LOSS OF DRILLING FLUID OBSERVED. 6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 2-B	**BORING LOCATION** 20+09	**OFFSET** 10.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -8.4 ft	**NORTHING** 496,885.1	**EASTING** 2,586,943.0		**24 HR.** N/A
TOTAL DEPTH 76.8 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/26/05	**COMPLETED** 10/26/05	**SURFACE WATER DEPTH** 8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.4					RIVER LEVEL		▽		
					RIVER BOTTOM				-8.4 / 0.00
-11.9	3.5						Sat.		**ALLUVIUM:** MEDIUM DENSE DARK GRAY SILTY FINE TO COARSE SAND (A-2-4)
		2	10	6	16				-14.4 / 6.0
-16.9	8.5						Sat.		VERY LOOSE GRAY COARSE TO FINE SAND (A-3)
		2	1	2	3				-19.4 / 11.0
-21.9	13.5								**YORKTOWN FORMATION:** STIFF GRAY CLAYEY FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL
		4	6	8	14	SS-3	W		-25.4 / 17.0
-26.9	18.5								**BELGRADE FORMATION:** MODERATELY INDURATED THINLY TO THICKLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF SAND LAYERS
-28.7	20.3	42	23	16	39		W		
		20	15	25	40		W		-31.4 / 23.0
-33.7	25.3								VERY DENSE TO DENSE TAN FINE TO COARSE SAND (A-1-b) WITH TRACE OF SILT
		19	41	40	81		Sat.		
-38.7	30.3								
		18	20	24	44		Sat.		-42.4 / 34.0
-43.7	35.3								DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
		16	14	17	31		Sat.		-47.4 / 39.0
-48.7	40.3								FRIABLE TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
		16	23	22	45		Sat.		
-53.7	45.3								
		16	15	15	30		Sat.		
-58.7	50.3								
		15	15	15	30		Sat.		
-63.7	55.3								-62.7 / 54.3
		60/0.2			60/0.2		Sat.		**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF SAND LAYERS
-68.7	60.3								
		44	56/0.3		100/0.8		Sat.		
-73.7	65.3								
		38	39	25	64		Sat.		

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 2-B	**BORING LOCATION** 20+09	**OFFSET** 10.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -8.4 ft	**NORTHING** 496,885.1	**EASTING** 2,586,943.0		**24 HR.** N/A
TOTAL DEPTH 76.8 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/26/05	**COMPLETED** 10/26/05	**SURFACE WATER DEPTH** 8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.2					Continued from previous page				
-78.7	70.3						Sat		**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF SAND LAYERS *(continued)*
		40	30	30	60				
-83.7	75.3						Sat		-85.2 / 76.8
		35	36	29	65				
					BORING TERMINATED AT ELEV. -85.2 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING 18.5 FEET. 2) SET NW CASING TO 18.5 FEET (TEMP CASING 20.5 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER TO 75.3 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF. 6) NO LOSS OF DRILLING FLUID OBSERVED.

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 3-A	**BORING LOCATION** 21+10	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -6.1 ft	**NORTHING** 496,987.8	**EASTING** 2,586,943.2		**24 HR.** N/A
TOTAL DEPTH 66.5 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/2/05	**COMPLETED** 11/2/05	**SURFACE WATER DEPTH** 5.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.4					RIVER LEVEL		▽		
-6.1	0.0				RIVER BOTTOM				-6.1 / 0.0
-10.9	4.8	4	WOH	WOH	WOH		Sat.		**ALLUVIUM:** VERY LOOSE DARK GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF SHELL MATERIAL / -9.1 / 3.0
-15.9	9.8	WOR	WOR	WOR	WOR	SS-4	Sat		VERY LOOSE GRAY FINE SAND (A-3) / -14.1 / 8.0
-20.9	14.8	1	WOH	2	2		Sat.		VERY LOOSE LIGHT GRAY FINE TO COARSE SAND (A-1-b) / -17.1 / 11.0
-25.9	19.8	1	1	1	2		W		SOFT BROWN CLAYEY FINE SANDY SILT (A-4) / -25.1 / 19.0
-30.9	24.8	WOH	2	2	4		Sat.		VERY LOOSE BROWN SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS / -29.1 / 23.0
-35.9	29.8	7	5	9	14		Sat.		**BELGRADE FORMATION:** MEDIUM DENSE GRAY-TAN SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF INDURATED THINLY BEDDED GRAY-TAN SANDY LIMESTONE / -34.1 / 28.0
-39.9	33.8	14	23	19	42		Sat.		DENSE GRAY-TAN SLIGHTLY SILTY FINE SAND (A-3) / -39.1 / 33.0
-46.6	40.5	7	10	11	21		Sat.		MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) / -41.4 / 35.3
-51.6	45.5	8	12	12	24		Sat.		MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED TO INDURATED VERY THINLY TO THINLY BEDDED GRAY SANDY LIMESTONE
-56.6	50.5	5	11	14	25		Sat.		/ -53.5 / 47.4
-61.6	55.5	6	13	17	30		Sat.		FRIABLE TO INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS / -60.6 / 54.5
-66.6	60.5	50	50/0.5		100		Sat.		**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-71.6	65.5	29	29	42	71		Sat.		
		28	72/0.5		100		Sat.		-72.6 / 66.5

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 3-A	**BORING LOCATION** 21+10	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -6.1 ft	**NORTHING** 496,987.8	**EASTING** 2,586,943.2		**24 HR.** N/A
TOTAL DEPTH 66.5 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/2/05	**COMPLETED** 11/2/05	**SURFACE WATER DEPTH** 5.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.2					Continued from previous page				-72.6 / 66.5
					BORING TERMINATED AT ELEV. -72.6 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 33.8 FEET. 2) SET NW CASING TO 33.8 FEET (TEMP CASING 18.9 FEET). 3) ADVANCED NWD4 CORE BARREL FROM 35.3 TO 60.5 FEET. 4) ADVANCED 2-7/8" TRICONE FROM 60.5 TO 65.5 FEET. 5) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

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CORE BORING REPORT

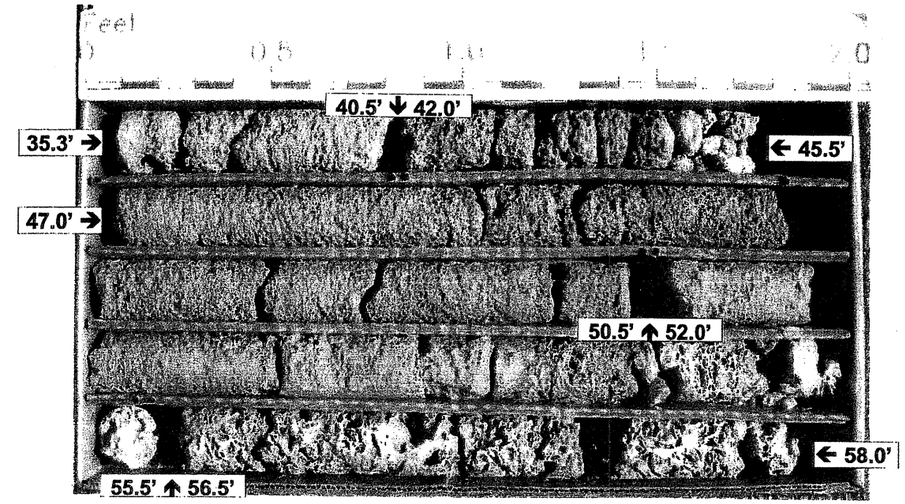
SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 3-A	**BORING LOCATION** 21+10	**OFFSET** 8.0 ft LT **ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -6.1 ft	**NORTHING** 496,987.8	**EASTING** 2,586,943.2	**24 HR.** N/A
TOTAL DEPTH 66.5 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/2/05	**COMPLETED** 11/2/05	**SURFACE WATER DEPTH** 5.7 ft	
CORE SIZE NWD4	**TOTAL RUN** 25.2 ft	**DRILLER** M. MOSELEY	

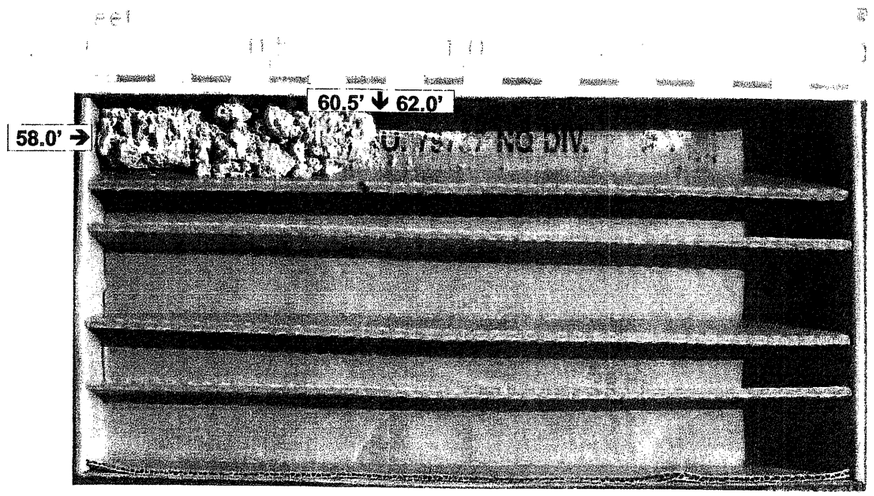
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 35.3 ft
-41.4	35.3	5.2	0:15 0:15 0:20 0:20 0:25/1.2	(0.7) 13%	(N/A)		(1.6) 13%			**BELGRADE FORMATION:** MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED TO INDURATED VERY THINLY TO THINLY BEDDED GRAY SANDY LIMESTONE
-46.6	40.5		*N=24*							
-48.1	42.0	3.5	0:15 0:20 0:20 0:15/0.5	(0.9) 26%	(N/A)					
-51.6	45.5		*N=25*							
-53.1	47.0	3.5	0:20 0:20 0:25 0:15/0.5	(3.1) 89%	(N/A)		(4.6) 65%			FRIABLE TO INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-56.6	50.5		*N=30*							
-58.1	52.0	3.5	0:45 0:45 1:00 0:30/0.5	(2.5) 71%	(N/A)					
-61.6	55.5		*N=100*				(3.4) 57%			**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-62.6	56.5	4.0	0:50 2:00 2:00 2:00	(2.4) 60%	(N/A)					
-66.6	60.5		*N=71*							
-72.6	66.5		*N=100*							BORING TERMINATED AT ELEV. -72.6 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B3-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller:* M. Moseley
Collar Elev.: -6.1 ft.	*Core Size:* NWD4	*Equipment:* Mobile B-57	*Geologist:* S. Johnson
Elev. at T.D.: -72.6 ft.	*Total Depth:* 66.5 ft.	*Total Run:* 25.2 ft.	*Date:* 11/02/2005



Box 1 of 2
Top of Box @ 35.3 feet; Bottom of Box @ 58.0 feet



Box 2 of 2
Top of Box @ 58.0 feet; Bottom of Box @ 62.0 feet

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 4-B	**BORING LOCATION** 21+96	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.7 ft	**NORTHING** 497,069.5	**EASTING** 2,586,974.2		**24 HR.** N/A
TOTAL DEPTH 80.4 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/27/05	**COMPLETED** 10/27/05	**SURFACE WATER DEPTH** 13.2 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
0.5					RIVER LEVEL		▽		
-12.7	0.0				RIVER BOTTOM				-12.7 0.00
-14.9	2.2	WOH	WOH	WOH	WOH		W		**ALLUVIUM:** VERY SOFT DARK BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK)
		WOH	WOH	WOH	WOH		W		-14.7 2.0
-19.9	7.2	3	2	3	5	SS-5	W		VERY SOFT TO MEDIUM STIFF GRAY CLAYEY FINE SANDY SILT (A-4)
-24.9	12.2	WOH	WOH	WOH	WOH		W		
-29.9	17.2	3	4	8	12		W		-27.7 15.0
-34.9	22.2	25	37	36	73		Sat.		**BELGRADE FORMATION:** MEDIUM DENSE TAN SILTY FINE TO COARSE SAND (A-1-b)
-39.9	27.2	13	13	12	25		Sat.		-33.2 20.5 WITH INDURATED THINLY BEDDED TAN SANDY LIMESTONE LAYERS
-45.4	32.7	12	14	14	28		Sat.		VERY DENSE SILTY FINE TO COARSE SAND (A-1-b)
-50.4	37.7	15	14	19	33		Sat.		-38.7 26.0 WITH TRACE OF CEMENTED SAND LAYERS
-55.4	42.7	16	16	21	37		Sat.		MEDIUM DENSE TAN-GRAY SILTY FINE TO COARSE SAND (A-1-b)
-60.4	47.7	51	49/0.3		100/0.8		Sat.		-43.7 31.0 WITH MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE
-65.4	52.7	61	39/0.5		100		Sat.		FRIABLE TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-70.4	57.7	60/0.0			60/0.0		Sat.		-59.2 46.5 **RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF SAND LAYERS

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 4-B	**BORING LOCATION** 21+96	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.7 ft	**NORTHING** 497,069.5	**EASTING** 2,586,974.2		**24 HR.** N/A
TOTAL DEPTH 80.4 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/27/05	**COMPLETED** 10/27/05	**SURFACE WATER DEPTH** 13.2 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-74.3					Continued from previous page				
-75.4	62.7								
-80.4	67.7	27	21	32	53		Sat		**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF SAND LAYERS *(continued)*
-85.4	72.7	35	31	23	54		Sat		
-90.4	77.7	32	20	22	42		Sat		
-92.4	79.7	54	46/0.3		100/0.8		Sat		
		57	43/0.2		100/0.7		Sat		-93.1 80.4

BORING TERMINATED AT ELEV. -93.1 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.

1) ADVANCED NW CASING TO 27.2 FEET.
2) SET NW CASING TO 27.2 FEET (TEMP CASING 26.0 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER TO 79.7 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.
6) NO LOSS OF DRILLING FLUID OBSERVED.

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SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N.Bradley/S.Johnson
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 5-A	**BORING LOCATION** 22+90	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -9.9 ft	**NORTHING** 497,164.9	**EASTING** 2,586,975.2		**24 HR.** N/A
TOTAL DEPTH 80.6 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/4/05	**COMPLETED** 11/7/05	**SURFACE WATER DEPTH** 9.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.2					RIVER LEVEL		▽		
-9.9	0.0				RIVER BOTTOM				-9.9 0.00
-14.7	4.8	WOH	WOH	WOH	WOH		Sat.		**ALLUVIUM:** VERY LOOSE DARK GRAY SILTY FINE SAND (A-2-4)
-19.7	9.8	WOH	WOH	WOH	WOH		Sat.		-16.9 7.0 VERY LOOSE GRAY FINE SAND (A-3)
-24.7	14.8	1	1	1	2		Sat.		-21.9 12.0 MEDIUM DENSE GRAY FINE SAND (A-2-4) WITH TRACE OF SILT AND CLAY
-29.7	19.8	8	7	6	13	SS-6	Sat.		-27.4 17.5 LOOSE DARK GRAY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS AND SHELL FRAGMENTS
-34.7	24.8	2	2	2	4		Sat.		-33.4 23.5 **BELGRADE FORMATION:** VERY DENSE GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-38.8	28.9	20	32	40	72		Sat.		-36.9 27.0 MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-43.8	33.9	4	7	7	14		Sat.		-45.9 36.0 FRIABLE TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-48.8	38.9	14	12	14	26		Sat.		
-53.8	43.9	7	11	9	20		Sat.		
-58.8	48.9	10	12	12	24		Sat.		
-63.8	53.9	10	42	27	69		Sat.		-65.3 55.4 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-68.8	58.9	18	21	21	42		Sat.		
-74.0	64.1	52	48/0.3		100/0.8		Sat.		-71.9 62.0
		27	25	29	54		Sat.		

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N.Bradley/S.Johnson
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 5-A	**BORING LOCATION** 22+90	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -9.9 ft	**NORTHING** 497,164.9	**EASTING** 2,586,975.2		**24 HR.** N/A
TOTAL DEPTH 80.6 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/4/05	**COMPLETED** 11/7/05	**SURFACE WATER DEPTH** 9.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.0					Continued from previous page				
-79.0	69.1	26	34	40	74		Sat.		INDURATED TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-84.0	74.1	25	26	22	48		Sat.		
-89.0	79.1	27	36	38	74		Sat.		-90.5 80.6
					BORING TERMINATED AT ELEV. -90.5 FEET IN INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE.				

1) ADVANCED NW CASING TO 24.8 FEET.
2) SET 24.8 FEET OF NW CASING (TEMP CASING 23.8 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER FROM 30.4 TO 79.1 FEET.
4) RIVER WATER USED AS DRILLING FLUID WITH QUICKGEL ADDED.
5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. RIGGS
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 6-B	**BORING LOCATION** 23+88	**OFFSET** 10.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.7 ft	**NORTHING** 497,258.1	**EASTING** 2,587,010.3		**24 HR.** N/A
TOTAL DEPTH 81.5 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller Bit	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/8/05	**COMPLETED** 11/8/05	**SURFACE WATER DEPTH** 12.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
0.0									
-12.7	0.0				RIVER BOTTOM				-12.7 0.00
-18.8	6.1	1	2	1	3		Sat.		**ALLUVIUM:** VERY LOOSE BROWN SLIGHTLY SILTY FINE SAND (A-3)
-23.4	10.7	1	WOH	WOH	WOH	SS-7	Sat.		-17.7 5.0 WITH LITTLE ORGANIC MATTER VERY LOOSE BROWN HIGHLY ORGANIC FINE SAND (MUCK) ORGANIC CONTENT 39.6%
-28.4	15.7	3	4	5	9		Sat.		-21.7 9.0 LOOSE TO MEDIUM DENSE GRAY SILTY FINE SAND (A-2-4)
-33.4	20.7	6	7	5	12		Sat.		
-38.4	25.7	12	21	33	54		Sat.		-32.7 20.0 **BELGRADE FORMATION:** VERY DENSE GRAY SLIGHTLY SILTY FINE SAND (A-2-4)
-43.3	30.6	12	10	11	21		Sat.		-36.7 24.0 WITH TRACE OF LIMESTONE FRAGMENTS AND SHELL MATERIAL MEDIUM DENSE GRAY SLIGHTLY SILTY FINE TO COARSE SAND (A-1-b)
-48.3	35.6	8	14	11	25		Sat.		WITH FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-53.3	40.6	10	10	10	20		Sat.		-46.7 34.0 FRIABLE TO MODERATELY INDURATED VERY THINLY TO THINLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-58.3	45.6	12	11	11	22		Sat.		
-63.3	50.6	13	11	20	31		Sat.		-60.8 48.1 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-68.3	55.6	54	46/0.4		100/0.9		Sat.		
-73.3	60.6	27	42	57	99		Sat.		-70.7 58.0
		36	27	31	58		Sat.		

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. RIGGS
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 6-B	**BORING LOCATION** 23+88	**OFFSET** 10.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.7 ft	**NORTHING** 497,258.1	**EASTING** 2,587,010.3		**24 HR.** N/A
TOTAL DEPTH 81.5 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller Bit	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/8/05	**COMPLETED** 11/8/05	**SURFACE WATER DEPTH** 12.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-74.8					Continued from previous page				
-78.3	65.6	27	35	26	61		Sat.		INDURATED TO EXTREMELY INDURATED VERY THINLY TO THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-83.3	70.6	20	17	22	39		Sat.		
-88.3	75.6	18	18	31	49		Sat.		
-93.3	80.6	62	38/0.4		100/0.9		Sat.		-94.2 81.5

BORING TERMINATED AT ELEV. -94.2 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.

1) ADVANCED NW CASING TO 26.0 FEET.
2) SET NW CASING TO 26.0 FEET (TEMP CASING 27.2 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER BIT FROM 26.0 TO 80.6 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 48.1 FEET.
6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 7-A	**BORING LOCATION** 24+77	**OFFSET** 24.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.1 ft	**NORTHING** 497,351.8	**EASTING** 2,586,992.6		**24 HR.** N/A
TOTAL DEPTH 78.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone to NWD4	**HAMMER TYPE** MANUAL
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 11.6 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.5					RIVER LEVEL		▽		
					RIVER BOTTOM				-13.1 / 0.00
-14.1	1.0	WOH	WOH	WOH	WOH	SS-8	W		**ALLUVIUM:** VERY SOFT TO STIFF DARK BROWN TO BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK) WITH PIECES OF WOOD ORGANIC CONTENT 24.7%
-18.2	5.1	WOH	WOH	WOH	WOH		W		
-23.2	10.1	6	6	6	12		W		-25.6 / 12.5 LOOSE GRAY SLIGHTLY SILTY COARSE TO FINE SAND (A-3)
-28.2	15.1	4	3	4	7	SS-9	Sat.		
-33.2	20.1	5	4	3	7		Sat.		-30.6 / 17.5 LOOSE GRAY SLIGHTLY SILTY FINE TO COARSE SAND (A-1-b)
-38.2	25.1	10	11	14	25		Sat.		-36.1 / 23.0 **BELGRADE FORMATION:** MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS
-43.2	30.1	11	11	15	26		Sat.		-41.1 / 28.0 MEDIUM DENSE GRAY-TAN SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY-TAN SANDY LIMESTONE LAYERS
-50.3	37.2	10	11	13	24		Sat.		-44.7 / 31.6 MODERATELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-55.3	42.2	10	14	17	31		Sat.		
-60.3	47.2	11	54	46/0.4	100/0.9		Sat.		-61.3 / 48.2 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-65.3	52.2	41	30	22	52		Sat.		
-70.3	57.2	54	46/0.3		100/0.8		Sat.		
-75.3	62.2	34	30	31	61		Sat.		

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 7-A	**BORING LOCATION** 24+77	**OFFSET** 24.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.1 ft	**NORTHING** 497,351.8	**EASTING** 2,586,992.6		**24 HR.** N/A
TOTAL DEPTH 78.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone to NWD4	**HAMMER TYPE** MANUAL
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 11.6 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-76.3					Continued from previous page				
-80.3	67.2	52	48/0.5		100		Sat.		-81.3 / 68.2 DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE LAYERS
-85.3	72.2	12	18	26	44		Sat.		-86.8 / 73.7 INDURATED TO EXTREMELY INDURATED THICKLY BEDDED GRAY MOLDIC LIMESTONE
-90.3	77.2	31	26	28	54		Sat.		-91.8 / 78.7
					BORING TERMINATED AT ELEV. -91.8 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				

1) ADVANCED NW CASING TO 30.1 FEET.
2) SET NW CASING TO 30.1 FEET (TEMP CASING 12.7 FEET).
3) ADVANCED 2-7/8" TRICONE TO 31.6 FEET.
4) ADVANCED NWD4 CORE BARREL FROM 31.6 TO 77.2 FEET.
5) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.
7) LOSS OF DRILLING FLUID OBSERVED BELOW 47 FEET.

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N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 7-A	**BORING LOCATION** 24+77	**OFFSET** 24.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.1 ft	**NORTHING** 497,351.8	**EASTING** 2,586,992.6	**24 HR.** N/A
TOTAL DEPTH 78.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone to NWD4	**HAMMER TYPE** MANUAL
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 11.6 ft	
CORE SIZE NWD4	**TOTAL RUN** 47.1 ft	**DRILLER** A. MARTIN	

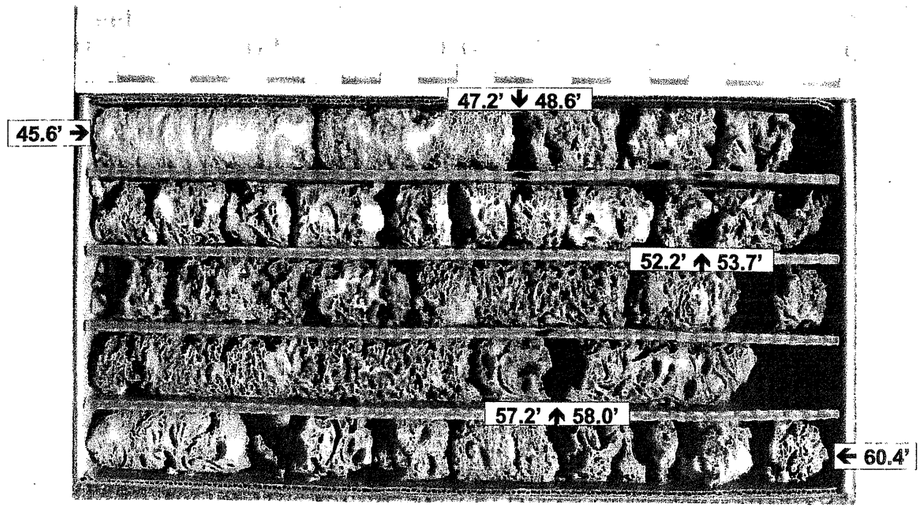
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										-44.7 Begin Coring @ 31.6 ft 31.6
-44.7	31.6	5.6	0:20 0:20 0:15 0:15 0:20	(4.2) 75%	(N/A)		(9.9) 60%			-44.7 31.6 **BELGRADE FORMATION:** MODERATELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-50.3	37.2		0:10/0.6 *N=24*							
-51.8	38.7	3.5	0:20 0:20 0:20	(2.7) 77%	(N/A)					
-55.3	42.2		0:10/0.5 *N=31*							
-56.8	43.7	3.5	0:25 0:25 0:30	(3.0) 86%	(N/A)					
-60.3	47.2		0:15/0.5 *N=100/0.9*							-61.3 48.2
-61.7	48.6	3.6	1:30 1:20 1:15	(2.5) 69%	(N/A)		(10.8) 54%			**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-65.3	52.2		0:45/0.6 *N=52*							
-66.8	53.7	3.5	1:00 1:45 2:00	(3.3) 94%	(N/A)					
-70.3	57.2		0:45/0.5 *N=100/0.8*							
-71.1	58.0	4.2	4:05 4:00 3:45	(2.7) 64%	(N/A)					
-75.3	62.2		4:00 0:30/0.2 *N=61*							
-76.8	63.7	3.5	2:40 2:45 3:00	(2.3) 66%	(N/A)					
-80.3	67.2		1:35/0.5 *N=100*							-81.3 68.2
-81.3	68.2	4.0	1:30 1:35 1:25	(1.3) 33%	(N/A)		(1.3) 24%			DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE LAYERS
-85.3	72.2		1:30 *N=44*							-86.8 73.7
-86.8	73.7	3.5	1:30 1:40 1:45	(3.5) 100%	(N/A)		(3.5) 70%			INDURATED TO EXTREMELY INDURATED THICKLY BEDDED GRAY MOLDIC LIMESTONE
-90.3	77.2		0:35/0.5 *N=54*							-91.8 78.7
-91.8	78.7									BORING TERMINATED AT ELEV. -91.8 FEET IN INDURATED GRAY MOLDIC LIMESTONE.

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B7-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -13.1 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -91.8 ft.	*Total Depth:* 78.7 ft.	*Total Run:* 47.1 ft.	*Date*: 11/09/2005

Box 1 of 3

Top of Box @ 31.6 feet; Bottom of Box @ 45.6 feet



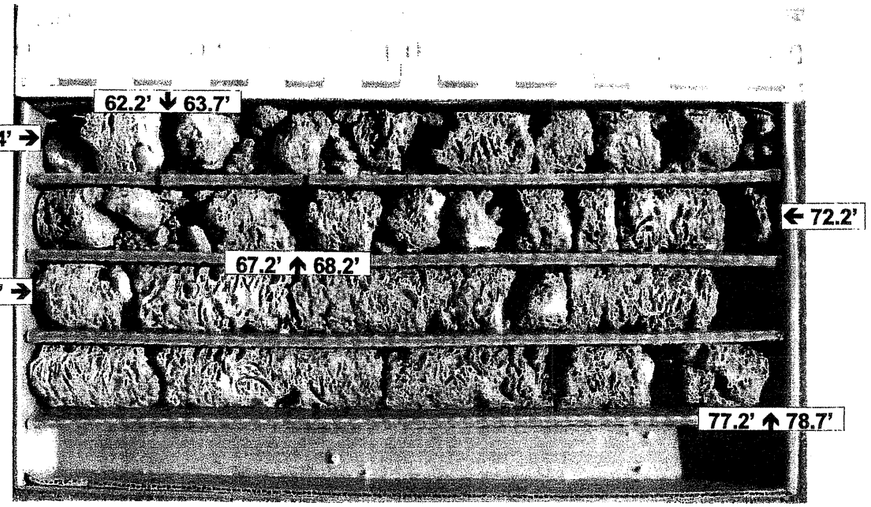
Box 2 of 3

Top of Box @ 45.6 feet; Bottom of Box @ 60.4 feet

S&ME

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B7-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -13.1 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -91.8 ft.	*Total Depth:* 78.7 ft.	*Total Run:* 47.1 ft.	*Date*: 11/09/2005



Box 3 of 3

Top of Box @ 60.4 feet; Bottom of Box @ 78.7 feet

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 8-B	**BORING LOCATION** 25+71	**OFFSET** 24.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.5 ft	**NORTHING** 497,435.7	**EASTING** 2,587,056.5		**24 HR.** N/A
TOTAL DEPTH 81.8 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/8/05	**COMPLETED** 11/8/05	**SURFACE WATER DEPTH** 12.1 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.4					RIVER LEVEL		▽		
					RIVER BOTTOM				-13.5 0.00
-19.0	5.5				WOR		W		**ALLUVIUM:** VERY SOFT BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK)
		WOR	WOR	WOR	WOR		W		
-24.0	10.5				WOH		W		
		WOH	WOH	WOH	WOH		W		
-29.0	15.5				WOH		W		
		WOH	WOH	WOH	WOH		W		
-34.0	20.5				WOH	SS-10	26.4	Sat.	-34.0 20.5 VERY SOFT GRAY CLAYEY FINE SANDY SILT (A-4)
		WOH	WOH	WOH	WOH				-37.5 24.0 WITH TRACE OF ORGANIC MATTER
-39.0	25.5				WOH				**BELGRADE FORMATION:** MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
		9	9	14	23			Sat.	-42.5 29.0 WITH TRACE OF INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-43.8	30.3								MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
		15	16	13	29			Sat.	WITH FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-48.8	35.3								
		12	12	14	26			Sat.	-52.5 39.0 FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-53.8	40.3								WITH TRACE OF THIN SAND LAYERS
		14	15	12	27			Sat.	-57.0 43.5 MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
-58.8	45.3								WITH MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
		15	14	14	28			Sat.	-61.6 48.1 **RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-63.8	50.3								
		40	26	17	43			Sat.	
-68.8	55.3								
		54	32	40	72			Sat.	
-73.8	60.3								
		80	20/0.2		100/0.7			Sat.	-75.5 62.0

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 8-B	**BORING LOCATION** 25+71	**OFFSET** 24.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.5 ft	**NORTHING** 497,435.7	**EASTING** 2,587,056.5		**24 HR.** N/A
TOTAL DEPTH 81.8 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/8/05	**COMPLETED** 11/8/05	**SURFACE WATER DEPTH** 12.1 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-76.2					Continued from previous page				
-78.8	65.3								FRIABLE TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
		30	28	20	48		Sat.		
-83.8	70.3								
		26	29	17	46		Sat.		
-88.8	75.3								
		29	26	27	53		Sat.		
-93.8	80.3								
		29	28	38	66		Sat.		-95.3 81.8
					BORING TERMINATED AT ELEV. -95.3 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 25.5 FEET. 2) SET NW CASING TO 25.5 FEET(TEMP CASING 13.2 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER TO 80.3 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) SOME LOSS OF DRILLING FLUID OBSERVED. 6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/1/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. RIGGS
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 9-A	**BORING LOCATION** 26+66	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.8 ft	**NORTHING** 497,535.1	**EASTING** 2,587,040.9	**24 HR.** N/A
TOTAL DEPTH 80.2 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 12.5 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.3					RIVER LEVEL		▽		
-12.8	0.0				RIVER BOTTOM				-12.8 0.00
-16.4	3.6	WOR	WOR	WOR	WOR		W		**ALLUVIUM:** VERY SOFT DARK GRAY HIGHLY ORGANIC CLAYEY SILT (MUCK)
-21.4	8.6	WOR	WOR	WOR	WOR		W		
-26.4	13.6	WOH	WOH	WOH	WOH		W		-25.8 13.0
-31.4	18.6	3	5	5	10		Sat.		LOOSE DARK GRAY TO GRAY COARSE TO FINE SAND (A-2-4) WITH TRACE OF SILT, CLAY AND ORGANIC MATTER
-36.4	23.6	5	2	3	5	SS-11	Sat.		
-41.5	28.7	13	9	11	20		Sat.		-34.8 22.0 MEDIUM DENSE LIGHT GRAY FINE TO COARSE SAND (A-1-b)
-46.5	33.7	12	10	9	19		Sat.		-39.8 27.0 **BELGRADE FORMATION:** MEDIUM DENSE TAN-GRAY SLIGHTLY CLAYEY SLIGHTLY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-51.5	38.7	10	8	8	16		Sat.		
-56.5	43.7	11	9	10	19		Sat.		-50.3 37.5 FRIABLE TO MODERATELY INDURATED VERY THINLY TO THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-61.5	48.7	12	12	14	26		Sat.		-59.0 46.2 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF VERY THIN SAND LAYERS
-66.5	53.7	64	36/0.4		100/0.9		Sat.		
-71.5	58.7	36	35	65/0.4	100/0.9		Sat.		
		46	54/0.4		100/0.9		Sat.		-73.0 60.2

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/2/05

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. RIGGS
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B 9-A	**BORING LOCATION** 26+66	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.8 ft	**NORTHING** 497,535.1	**EASTING** 2,587,040.9	**24 HR.** N/A
TOTAL DEPTH 80.2 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 12.5 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.1					Continued from previous page				
-76.5	63.7								INDURATED TO EXTREMELY INDURATED VERY THINLY TO THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-81.5	68.7	27	27	26	53		Sat.		
-86.5	73.7	22	19	17	36		Sat.		
-91.5	78.7	26	23	30	53		Sat.		
		36	35	35	70		Sat.		-93.0 80.2
					BORING TERMINATED AT ELEV. -93.0 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 32.1 FEET. 2) SET NW CASING TO 32.1 FEET (TEMP CASING 29.0 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER FROM 32.1 TO 78.7 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF. 6) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 46.1 FEET.

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B10-B	**BORING LOCATION** 27+58	**OFFSET** 22.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -14.3 ft	**NORTHING** 497,620.2	**EASTING** 2,587,087.8		**24 HR.** N/A
TOTAL DEPTH 81.2 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 12.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.6					RIVER LEVEL		▽		
-14.3	0.0				RIVER BOTTOM				-14.3 / 0.00
		1	1	1	⊙2		Sat.		**ALLUVIUM:** VERY LOOSE GRAY FINE SAND (A-3) WITH TRACE OF SILT
-19.3	5.0	1	1	3	⊙4		Sat.		
-24.3	10.0	1	1	1	⊙2		Sat.		
-29.3	15.0	WOH	1	WOH	⊙1		Sat.		
-34.3	20.0	WOH	WOH	WOH	⊙WOH		Sat.		-33.3 / 19.0 VERY LOOSE GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF SILT AND ORGANIC LAYERS
-39.3	25.0	3	1	2	⊙3		Sat.		-41.8 / 27.5 **BELGRADE FORMATION:** MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
-44.3	30.0	9	11	12	⊙23	SS-12	Sat.		-46.3 / 32.0 WITH MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-49.0	34.7	11	11	12	⊙23		Sat.		MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
-54.0	39.7	11	12	13	⊙25		Sat.		-51.3 / 37.0 WITH TRACE OF MODERATELY INDURATED TO FRIABLE THINLY BEDDED GRAY SANDY LIMESTONE
-59.0	44.7	15	15	20	⊙35		Sat.		FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.0	49.7	32	68/0.5		100/1.0		Sat.		-62.3 / 48.0 **RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-69.0	54.7	25	42	58/0.2	100/0.7		Sat.		
-74.0	59.7	56	46/0.5		100/1.0		Sat.		

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B10-B	**BORING LOCATION** 27+58	**OFFSET** 22.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -14.3 ft	**NORTHING** 497,620.2	**EASTING** 2,587,087.8		**24 HR.** N/A
TOTAL DEPTH 81.2 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/9/05	**COMPLETED** 11/9/05	**SURFACE WATER DEPTH** 12.7 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-76.4					Continued from previous page				
-79.0	64.7								
-84.0	69.7	27	33	27	⊙60		Sat.		**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-89.0	74.7	20	21	22	⊙43		Sat.		
-94.0	79.7	23	25	41	⊙66		Sat.		
		22	27	40	⊙67		Sat.		-95.5 / 81.2 BORING TERMINATED AT ELEV. -95.5 FEET IN INDURATED GRAY MOLDIC LIMESTONE.

1) ADVANCED NW CASING TO 34.7 FEET.
2) SET NW CASING TO 34.7 FEET(TEMP CASING 13.8 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER TO 79.7 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED FOR DRILLING FLUID.
5) LOSS OF DRILLING FLUID OBSERVED BELOW 50 FEET.
6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B11-A	**BORING LOCATION** 28+51	**OFFSET** 22.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -14.6 ft	**NORTHING** 497,719.5	**EASTING** 2,587,061.0		**24 HR.** N/A
TOTAL DEPTH 82.8 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/10/05	**COMPLETED** 11/10/05	**SURFACE WATER DEPTH** 12.2 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-2.4					RIVER LEVEL		▽		
-14.6	0.0				RIVER BOTTOM				-14.6 / 0.00
-15.6	1.0	1	2	1	3	W	Sat.		**ALLUVIUM:** SOFT GRAY CLAYEY SILT (A-4)
-20.1	5.5	WOH	1	1	2		Sat.		VERY LOOSE GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF ORGANIC MATTER
-25.1	10.5	2	1	2	3				
-27.1	12.5						Sat.		LOOSE GRAY SILTY FINE SAND (A-3) WITH TRACE OF ORGANIC MATTER
-30.1	15.5	4	3	3	6				
-35.1	20.5	4	5	4	9		Sat.		
-37.6	23.0								LOOSE GRAY FINE TO COARSE SAND (A-1-b) WITH TRACE OF SILT
-40.1	25.5	5	4	5	9		Sat.		
-42.6	28.0								**BELGRADE FORMATION:** FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH THIN FINE TO COARSE SAND LAYERS
-44.8	30.2	11	12	13	25		Sat.		
-46.3	31.7								MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-51.2	36.6	16	14	12	26				
-52.7	38.1						Sat.		FRIABLE TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE LAYERS
-56.2	41.6	18	18	17	35				
-57.7	43.1								DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF GRAY SANDY LIMESTONE LAYERS
-60.9	46.3								**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-61.2	46.6	89	11/0.1		100/0.6		Sat.		
-66.2	51.6	24	27	53	80				
-71.2	56.6	87	13/0.2		100/0.7		Sat.		
-76.2	61.6	36	29	25	54				

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B11-A	**BORING LOCATION** 28+51	**OFFSET** 22.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -14.6 ft	**NORTHING** 497,719.5	**EASTING** 2,587,061.0		**24 HR.** N/A
TOTAL DEPTH 82.8 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/10/05	**COMPLETED** 11/10/05	**SURFACE WATER DEPTH** 12.2 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-77.2					Continued from previous page				
-81.2	66.6	29	26	31	57		Sat.		**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-86.2	71.6	27	16	24	40		Sat.		
-91.2	76.6	21	25	25	50		Sat.		
-96.2	81.6	25	43	57/0.2	100/0.7		Sat.		
-97.4	82.8				BORING TERMINATED AT ELEV. -97.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 25.5 FEET. 2) SET NW CASING TO 25.5 FEET (TEMP CASING 13.3 FEET). 3) ADVANCED NWD4 CORE BARREL FROM 31.7 TO 81.6 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF. 6) LOSS OF DRILLING FLUID OBSERVED BELOW 50 FEET.

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/2/05

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CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B11-A	**BORING LOCATION** 28+51	**OFFSET** 22.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -14.6 ft	**NORTHING** 497,719.5	**EASTING** 2,587,061.0		**24 HR.** N/A
TOTAL DEPTH 82.8 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/10/05	**COMPLETED** 11/10/05	**SURFACE WATER DEPTH** 12.2 ft	
CORE SIZE NWD4	**TOTAL RUN** 51.1 ft	**DRILLER** A. MARTIN	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										-46.3 Begin Coring @ 31.7 ft 31.7
-46.3	31.7	4.9	1:00 1:00 0:45 0:30 0:20/0.9 *N=26*	(0.9) 18%	(N/A)		(0.9) 14%			-46.3 31.7 **BELGRADE FORMATION:** MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-51.2	36.6									
-52.7	38.1	3.5	1:00 1:15 1:00 0:30/0.5 *N=35*	(3.2) 91%	(N/A)		(3.2) 64%			-52.7 38.1 FRIABLE TO MODERATELY INDURATED THINLY TO THICKLY BEDDED GRAY SANDY LIMESTONE LAYERS
-56.2	41.6									
-57.7	43.1	3.5	1:00 2:00 3:00 2:00/0.5 *N=100/0.5*	(0.8) 23%	(N/A)		(0.5) 16%			-57.7 43.1 DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF SANDY LIMESTONE LAYERS
-61.2	46.6									-60.9 46.3
-61.8	47.2	4.4	2:10 2:15 2:10 2:30 1:00/0.4 *N=80*	(3.7) 84%	(N/A)		(23.4) 64%			**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-66.2	51.6									
-67.7	53.1	3.5	2:00 2:30 2:40 1:20/0.5 *N=100/0.1*	(3.1) 89%	(N/A)					
-71.2	56.6									
-71.9	57.3	4.3	1:40 1:35 1:40 1:30 0:20/0.3 *N=54*	(4.2) 98%	(N/A)					
-76.2	61.6									
-77.7	63.1	3.5	3:00 3:10 3:05 1:30/0.5 *N=57*	(2.3) 66%	(N/A)					
-81.2	66.6									
-82.7	68.1	3.5	2:05 2:10 2:15 1:00/0.5 *N=40*	(3.2) 91%	(N/A)					
-86.2	71.6									
-87.7	73.1	3.5	1:30 1:15 1:30 0:35/0.5 *N=50*	(3.3) 94%	(N/A)					
-91.2	76.6									
-92.7	78.1	3.5	2:00 2:00 2:30 1:00/0.5 *N=100/0.1*	(3.3) 94%	(N/A)					
-96.2	81.6									
-97.4	82.8									-97.4 82.8 BORING TERMINATED AT ELEV. -97.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE.

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B11-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -14.6 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -97.4 ft.	*Total Depth:* 82.8 ft.	*Total Run:* 51.1 ft.	*Date*: 11/10/2005

Box 1 of 4

Top of Box @ 31.7 feet; Bottom of Box @ 51.6 feet

Box 2 of 4

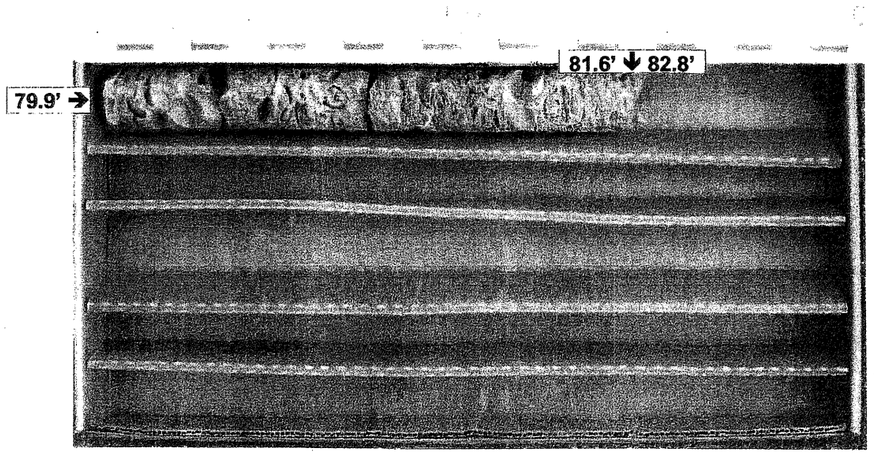
Top of Box @ 53.1 feet; Bottom of Box @ 64.9 feet

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B11-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -14.6 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -97.4 ft.	*Total Depth:* 82.8 ft.	*Total Run:* 51.1 ft.	*Date*: 11/10/2005

Box 3 of 4

Top of Box @ 64.9 feet; Bottom of Box @ 79.9 feet



Box 4 of 4

Top of Box @ 79.9 feet; Bottom of Box @ 82.8 feet

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N.Bradley/A.NASH
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B12-A	**BORING LOCATION** 29+50	**OFFSET** 23.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -16.4 ft	**NORTHING** 497,817.1	**EASTING** 2,587,077.6		**24 HR.** N/A
TOTAL DEPTH 72.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing /2-7/8" Tricone	**HAMMER TYPE** MANUAL
DATE STARTED 11/17/05	**COMPLETED** 11/18/05	**SURFACE WATER DEPTH** 15.1 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.3					RIVER LEVEL		▽		
-16.4	0.0				RIVER BOTTOM				-16.4 / 0.00
		WOR	WOR	WOR	WOR		W		**ALLUVIUM:** VERY SOFT BLACK HIGHLY ORGANIC FINE SANDY SILT (MUCK)
-22.4	6.0								
-23.7	7.3	WOH	WOH	WOH	WOH		Sat.		VERY LOOSE BROWN TO GRAY SILTY FINE SAND (A-2-4)
-28.7	12.3	2	1	1	2		Sat.		
-32.4	16.0								MEDIUM DENSE BROWN SILTY FINE TO COARSE SAND (A-2-4)
-33.7	17.3	6	5	10	15		Sat.		
-37.4	21.0								**BELGRADE FORMATION:** MEDIUM DENSE TAN-GRAY SILTY FINE TO COARSE SAND (A-1-b)
-38.2	21.8	9	10	9	19		Sat.		
-41.9	25.5								WITH MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE LAYERS
-43.2	26.8	18	15	13	28		Sat.		FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN TO GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-48.2	31.8	13	16	17	33		Sat.		
-53.2	36.8	18	15	19	34		Sat.		
-58.2	41.8	20	24	17	41		Sat.		
-60.2	43.8								**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-63.2	46.8	43	37	20	57		Sat.		
-68.2	51.8	60/0.2			60/0.2		Sat.		
-73.2	56.8	60/0.2			60/0.2		Sat.		

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/2/05

S&ME ENGINEERING • TESTING ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N.Bradley/A.NASH
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B12-A	**BORING LOCATION** 29+50	**OFFSET** 23.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -16.4 ft	**NORTHING** 497,817.1	**EASTING** 2,587,077.6		**24 HR.** N/A
TOTAL DEPTH 72.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing /2-7/8" Tricone	**HAMMER TYPE** MANUAL
DATE STARTED 11/17/05	**COMPLETED** 11/18/05	**SURFACE WATER DEPTH** 15.1 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-76.1					Continued from previous page				
-78.2	61.8						Sat.		**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
		60/0.2			60/0.2				
-83.2	66.8						Sat.		
		31	28	32	60				
-88.2	71.8								-88.4 / 72.0
		60/0.2			60/0.2		Sat.		1) ADVANCED NW CASING TO 17.3 FEET. 2) SET NW CASING TO 17.3 FEET (TEMP CASING 16.2 FEET). 3) ADVANCED 2-7/8" TRICONE TO 71.8 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 65 PCF. 6) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 45 FEET.
					BORING TERMINATED AT ELEV. -88.4 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE.				

NCDOT BORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/2/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON/N.Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B13-B	**BORING LOCATION** 30+29	**OFFSET** 57.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -15.9 ft	**NORTHING** 497,880.5	**EASTING** 2,587,170.3		**24 HR.** N/A
TOTAL DEPTH 109.6 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash/NW Casing/2-7/8" Tricone/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/11/05	**COMPLETED** 11/29/05	**SURFACE WATER DEPTH** 14.9 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.3					RIVER LEVEL		▽		
-15.9	0.0	WOR	WOR	WOR	WOR		W		**ALLUVIUM:** VERY SOFT BROWN FINE SANDY SILT (A-4)
-23.7	7.8	WOR	WOR	WOR	WOR		W		
-26.9	11.0								MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH LIMESTONE FRAGMENTS
-28.7	12.8	12	10	13	23		Sat.		
-31.9	16.0								DENSE GRAY FINE SAND (A-3) WITH TRACE OF SILT
-33.7	17.8	14	19	25	44		Sat.		
-36.9	21.0								**BELGRADE FORMATION:** FRIABLE THINLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-38.7	22.8	10	12	14	26		Sat.		
-41.9	26.0								MEDIUM DENSE TAN SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE THINLY BEDDED TAN SANDY LIMESTONE LAYERS
-43.4	27.5	10	9	10	19		Sat.		
-47.9	32.0								FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-49.4	33.5	12	13	13	26		Sat.		
-54.4	38.5	13	12	16	28		Sat.		
-59.4	43.5	14	14	21	35		Sat.		
-61.9	46.0								**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.4	48.5	34	40	19	59		Sat.		
-69.4	53.5	41	26	71	97		Sat.		
-74.4	58.5								

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON/N.Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B13-B	**BORING LOCATION** 30+29	**OFFSET** 57.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -15.9 ft	**NORTHING** 497,880.5	**EASTING** 2,587,170.3		**24 HR.** N/A
TOTAL DEPTH 109.6 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash/NW Casing/2-7/8" Tricone/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/11/05	**COMPLETED** 11/29/05	**SURFACE WATER DEPTH** 14.9 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.1					Continued from previous page				
-79.4	63.5	39	40	52	92		Sat.		**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-84.4	68.5	23	24	24	48		Sat.		
-89.4	73.5	32	25	24	49		Sat.		
-94.4	78.5	17	18	29	47		Sat.		
-99.4	83.5	31	37	37	74		Sat.		
-102.5	86.6	27	27	70	97		Sat.		
-107.5	91.6	48	20	24	44		Sat.		
-107.9	92.0								MEDIUM DENSE TO VERY DENSE GRAY SILTY FINE TO COARSE SAND (A-2-4)
-112.5	96.6	17	15	13	28		Sat.		
-113.9	98.0								VERY DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE TO INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-117.5	101.6	20	25	30	55		Sat.		
-123.0	107.1								MODERATELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-124.0	108.1	50	50/0.5		100/1.0		Sat.		
-125.5	109.6	31	19	34	53		Sat.		

BORING TERMINATED AT ELEV. -125.5 FEET IN MODERATELY INDURATED GRAY MOLDIC LIMESTONE.

1) ADVANCED NW CASING TO 22.8 FEET ON 11-11-05.
2) SET NW CASING TO 22.8 FEET (TEMP. CASING 16.0 FEET) ON 11-11-05.
3) ADVANCED 2-7/8" TRICONE ROLLER TO 83.5 FEET ON 11-11-05.
4) ADVANCED NW CASING TO 29.0 FEET ON 11-28-05.
5) SET NW CASING 29.0 FEET (TEMP CASING 16.0 FEET) ON 11-28-05.
6) ADVANCED 2-7/8" TRICONE ROLLER TO 86.6 FEET ON 11-28-05.
7) ADVANCED NWD4 CORE BARREL FROM 88.1 TO 108.1 FEET ON 11-29-05.
8) RIVER WATER USED WITH QUICKGEL ADDED AS DRILLING FLUID.
9) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.
10) SOME LOSS OF WATER OBSERVED BELOW 46.0 FEET.
11) BORING LOG IS A COMPOSITE OF TWO DRILLING EVENTS; 0-85.5 FEET ON 11/11/05 AND 85.0 TO 109.6 FEET ON 11/28-29/05.

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N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON/N.Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B13-B	**BORING LOCATION** 30+29	**OFFSET** 57.0 ft RT **ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -15.9 ft	**NORTHING** 497,880.5	**EASTING** 2,587,170.3	**24 HR.** N/A
TOTAL DEPTH 109.6 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash/NW Casing/2-7/8" Tricone/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/28/05	**COMPLETED** 11/29/05	**SURFACE WATER DEPTH** 14.9 ft	
CORE SIZE NWD4	**TOTAL RUN** 21.5 ft	**DRILLER** A. MARTIN	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										-104.0 Begin Coring @ 88.1 ft 88.1
-104.0	88.1	3.5	0:30/0.5 0:30 0:30 0:30 *N=28*	(1.6) 46%	(N/A)		(1.6) 41%			**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-107.5	91.6									-107.9 92.0
-109.0	93.1	3.5	0:30/0.5 0:30 0:45 0:35 *N=55*	(0.0) 0%	(N/A)		(0.0) 0%			MEDIUM DENSE TO VERY DENSE GRAY SILTY FINE TO COARSE SAND (A-2-4)
-112.5	96.6									-113.9 98.0
-114.0	98.1	3.5	0:30/0.5 0:45 0:45 0:35 *N=100/1.0*	(1.3) 37%	(N/A)		(2.1) 23%			VERY DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH FRIABLE TO INDURATED THINLY BEDDED GRAY SANDY LIMESTONE
-117.5	101.6									-123.0 107.1
-119.0	103.1	5.0	0:30/0.5 0:30 0:30 0:30 0:35*N=53*	(1.1) 22%	(N/A)		(1.0) 40%			MODERATELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS BORING TERMINATED AT ELEV. -125.5 FEET IN MODERATELY INDURATED GRAY MOLDIC LIMESTONE.
-124.0	108.1									-125.5 109.6
-125.5	109.6									

NCDOT CORE SINGLE 05-478NEW2.GPJ NCDOT.GDT 12/2/05

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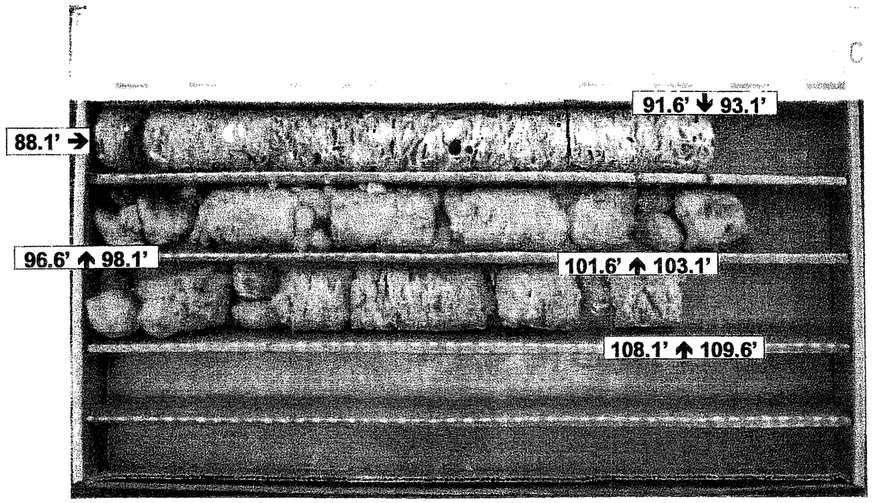
CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B13-B
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -15.9 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: N. Bradley
Elev. at T.D.: -125.5 ft.	*Total Depth:* 109.6 ft.	*Total Run:* 21.5 ft.	*Date*: 11/28-29/2005



Box 1 of 1

Top of Box @ 88.1 feet; Bottom of Box @ 109.6 feet

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B14-A	**BORING LOCATION** 32+16	**OFFSET** 54.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.7 ft	**NORTHING** 498,084.4	**EASTING** 2,587,094.3		**24 HR.** N/A
TOTAL DEPTH 82.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/15/05	**COMPLETED** 11/15/05	**SURFACE WATER DEPTH** 12.6 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.1					RIVER LEVEL		▽		
-13.8	0.1				RIVER BOTTOM				-13.7 / 0.00
-18.8	5.1	WOH	WOH	WOH	WOH		Sat.		**ALLUVIUM:** VERY LOOSE BROWN MODERATELY ORGANIC SILTY FINE SAND (A-2-4) ORGANIC CONTENT 9.7%
-23.8	10.1	1	1	1	2	SS-13	Sat.		-21.7 / 8.0 VERY LOOSE GRAY FINE SAND (A-3) WITH TRACE OF SILT
-28.8	15.1	2	1	2	3		Sat.		-26.7 / 13.0 LOOSE GRAY COARSE TO FINE SAND (A-3) WITH TRACE OF SILT AND LIMESTONE FRAGMENTS
-33.8	20.1	4	5	5	10		Sat.		-32.2 / 18.5 **BELGRADE FORMATION:** MEDIUM DENSE TAN SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS AND CEMENTED SANDS
-38.8	25.1	9	11	13	24		Sat.		
-43.8	30.1	11	12	13	25		Sat.		-41.7 / 28.0 FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-49.9	36.2	15	17	15	32		Sat.		
-54.9	41.2	13	18	15	33		Sat.		-51.4 / 37.7 MODERATELY INDURATED THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-59.9	46.2	21	18	18	36		Sat.		
-64.9	51.2	43	57/0.3		100/0.8		Sat.		-58.8 / 45.1 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-69.9	56.2	41	20	33	53		Sat.		
-74.9	61.2	84	16/0.1		100/0.6		Sat.		
		28	30	40	70		Sat.		

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B14-A	**BORING LOCATION** 32+16	**OFFSET** 54.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.7 ft	**NORTHING** 498,084.4	**EASTING** 2,587,094.3		**24 HR.** N/A
TOTAL DEPTH 82.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/15/05	**COMPLETED** 11/15/05	**SURFACE WATER DEPTH** 12.6 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.9					Continued from previous page				
-79.9	66.2	23	37	48	85		Sat.		**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-84.9	71.2	24	27	27	54		Sat.		
-89.9	76.2	18	31	28	59		Sat.		
-94.9	81.2	35	33	25	58		Sat.		-96.4 / 82.7
					BORING TERMINATED AT ELEV. -96.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE				

1) ADVANCED NW CASING TO 30.1 FEET.
2) SET NW CASING TO 30.1 FEET (TEMP CASING 13.7 FEET).
3) ADVANCED NWD4 CORE BARREL FROM 31.6 TO 81.2 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) APPROXIMATE DRILLING FLUID DENSITY 65 PCF.
6) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 46 FEET.

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B14-A	**BORING LOCATION** 32+16	**OFFSET** 54.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -13.7 ft	**NORTHING** 498,084.4	**EASTING** 2,587,094.3		**24 HR.** N/A
TOTAL DEPTH 82.7 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/15/05	**COMPLETED** 11/15/05	**SURFACE WATER DEPTH** 12.6 ft	
CORE SIZE NWD4	**TOTAL RUN** 51.1 ft	**DRILLER** A. MARTIN	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										-45.3 Begin Coring @ 31.6 ft 31.6
-45.3	31.6	4.6	1:00 1:05 1:00 1:00 0:30/0.6 N=33	(4.6) 100%	(N/A)		(4.6) 75%			**BELGRADE FORMATION:** FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-49.9	36.2									-51.4 37.7
-51.4	37.7	3.5	1:00 1:00 1:00 0:30/0.5 N=36	(3.5) 100%	(N/A)		(5.7) 77%			MODERATELY INDURATED THICKLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-54.9	41.2									-58.8 45.1
-56.4	42.7	3.5	1:10 1:05 1:00 0:30/0.5 N=100/0.5	(3.3) 94%	(N/A)		(25.4) 68%			**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-59.9	46.2									
-60.7	47.0	4.2	1:30 2:00 2:00 0:20/0.2 N=53	(3.6) 86%	(N/A)					
-64.9	51.2									
-66.4	52.7	3.5	1:30 1:30 1:40 0:40/0.5 N=100/0.6	(3.5) 100%	(N/A)					
-69.9	56.2									
-70.5	56.8	4.4	2:00 2:30 2:30 2:20 1:00/0.4 N=70	(4.3) 98%	(N/A)					
-74.9	61.2									
-76.4	62.7	3.5	1:00 1:00 1:10 0:30/0.5 N=85	(3.5) 100%	(N/A)					
-79.9	66.2									
-81.4	67.7	3.5	1:00 1:10 1:05 0:30/0.5 N=54	(2.9) 83%	(N/A)					
-84.9	71.2									
-86.4	72.7	3.5	2:00 2:05 2:15 0:45/0.5 N=59	(3.0) 86%	(N/A)					
-89.9	76.2									
-91.4	77.7	3.5	1:45 1:40 1:40 0:45/0.5 N=58							
-94.9	81.2									
-96.4	82.7									-96.4 82.7 BORING TERMINATED AT ELEV. -96.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE

NCDOT CORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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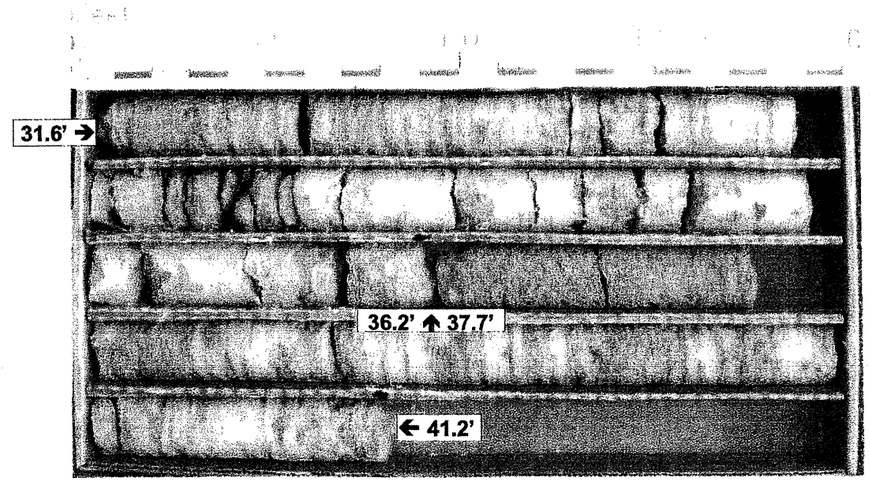
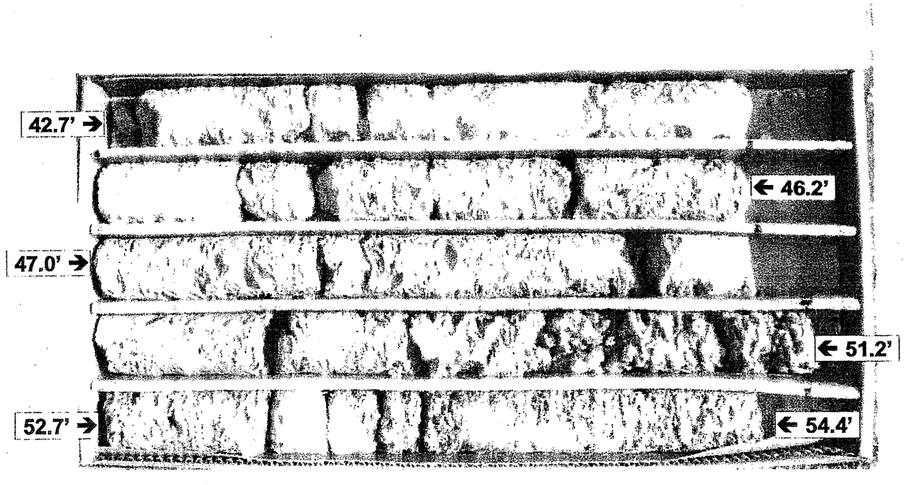
CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B14-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -13.7 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -96.4 ft.	*Total Depth:* 82.7 ft.	*Total Run:* 51.1 ft.	*Date*: 11/15/2005



Box 1 of 5
Top of Box @ 31.6 feet; Bottom of Box @ 41.2 feet

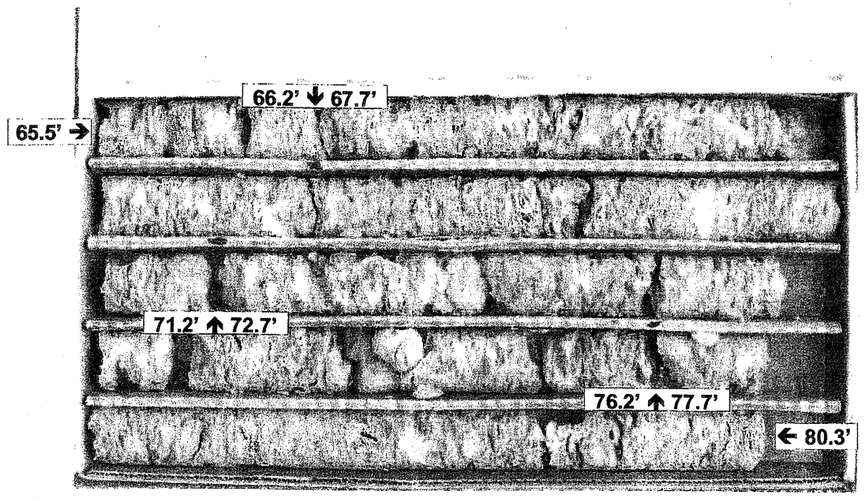


Box 2 of 5
Top of Box @ 42.7 feet; Bottom of Box @ 54.4 feet

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B14-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -13.7 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -96.4 ft.	*Total Depth:* 82.7 ft.	*Total Run:* 51.1 ft.	*Date*: 11/15/2005

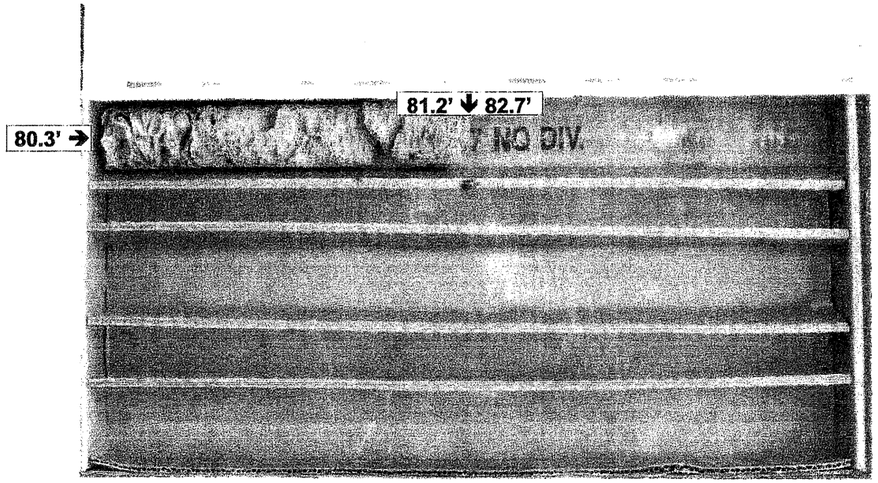
Box 3 of 5
Top of Box @ 54.4 feet; Bottom of Box @ 65.5 feet



Box 4 of 5
Top of Box @ 65.5 feet; Bottom of Box @ 80.3 feet

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B14-A
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -13.7 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -96.4 ft.	*Total Depth:* 82.7 ft.	*Total Run:* 51.1 ft.	*Date*: 11/15/2005



Box 5 of 5
Top of Box @ 80.3 feet; Bottom of Box @ 82.7 feet

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B15-A	**BORING LOCATION** 32+92	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.4 ft	**NORTHING** 498,151.0	**EASTING** 2,587,153.0		**24 HR.** N/A
TOTAL DEPTH 80.1 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/14/05	**COMPLETED** 11/15/05	**SURFACE WATER DEPTH** 11.8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.6					RIVER LEVEL		▽		
-12.4	0.0				RIVER BOTTOM				-12.4 / 0.00
-16.0	3.6	WOR	WOR	WOR	WOR		W		**ALLUVIUM:** VERY SOFT BLACK BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK) WITH TRACE OF WOOD DEBRIS
-21.0	8.6	WOH	WOH	WOH	WOH		W		-20.0 / 7.6
-26.0	13.6	WOH	WOH	WOH	WOH		Sat.		VERY SOFT GRAY CLAYEY FINE SANDY SILT (A-4)
-31.0	18.6	2	2	2	4		Sat.		-24.9 / 12.5 LOOSE GRAY SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS
-36.1	23.7	7	12	33	45		Sat.		-29.9 / 17.5 DENSE GRAY SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE OF CEMENTED SAND FRAGMENTS
-41.1	28.7	10	10	10	20		Sat.		-34.4 / 22.0 **BELGRADE FORMATION:** MEDIUM DENSE TAN-GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS
-46.1	33.7	9	10	10	20		Sat.		-43.4 / 31.0 FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-51.1	38.7	12	11	11	22		Sat.		
-56.1	43.7	12	12	12	24		Sat.		
-60.0	47.6	12	12	14	26		Sat.		-57.4 / 45.0 **RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.0	51.6	29	53	47	100		Sat.		
-69.0	56.6	41	40	33	73		Sat.		
-74.0	61.6	45	36	63	99		Sat.		
		27	26	29	55		Sat.		

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B15-A	**BORING LOCATION** 32+92	**OFFSET** 8.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.4 ft	**NORTHING** 498,151.0	**EASTING** 2,587,153.0		**24 HR.** N/A
TOTAL DEPTH 80.1 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/14/05	**COMPLETED** 11/15/05	**SURFACE WATER DEPTH** 11.8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.4					Continued from previous page				
-79.0	66.6								
-84.0	71.6	25	40	30	70		Sat.		**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
-91.0	78.6	25	23	24	47		Sat.		
		38	27	30	57		Sat.		-92.5 / 80.1
					BORING TERMINATED AT ELEV. -92.5 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 18.6 FEET. 2) SET NW CASING TO 18.6 FEET (TEMP CASING 29.5 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER FROM 23.7 TO 78.6 FEET. 4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF. 6) SOME LOSS OF DRILLING FLUID OBSERVED.

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BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. NASH
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B16-B	**BORING LOCATION** 33+69	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -7.8 ft	**NORTHING** 498,223.9	**EASTING** 2,587,182.5		**24 HR.** N/A
TOTAL DEPTH 80.5 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/10/05	**COMPLETED** 11/11/05	**SURFACE WATER DEPTH** 17.4 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.1					RIVER LEVEL		▽		
-7.8	0.0				RIVER BOTTOM				-7.8 0.00
-12.0	4.2	WOH	WOH	WOH	WOH		Sat.		**ALLUVIUM:** VERY SOFT DARK GRAY FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL -10.3 2.5
-17.0	9.2	1	WOH	1	1		Sat.		VERY LOOSE TO LOOSE BROWN FINE SAND (A-3) WITH SOME WOOD FRAGMENTS AND CLAY LAYERS
-22.0	14.2	3	3	5	8		No Rec.		-19.8 12.0
-27.0	19.2	2	4	5	9		W		STIFF GRAY FINE SANDY SILT (A-4) WITH TRACE OF SHELL MATERIAL -24.8 17.0
-31.8	24.0	9	12	26	38		Sat.		DENSE LIGHT GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF GRAY SANDY LIMESTONE FRAGMENTS -29.8 22.0
-36.8	29.0	15	9	8	17		Sat.		**BELGRADE FORMATION:** MEDIUM DENSE LIGHT GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF FRIABLE GRAY SANDY LIMESTONE LAYERS -34.5 26.7
-41.8	34.0	10	9	12	21		Sat.		MEDIUM DENSE LIGHT TAN SILTY COARSE TO FINE SAND (A-2-4) WITH FRIABLE THINLY BEDDED LIGHT TAN SANDY LIMESTONE LAYERS
-46.8	39.0	10	10	10	20		Sat.		
-51.8	44.0	12	11	13	24		Sat.		-44.5 36.7 FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-56.8	49.0	13	12	11	23		Sat.		
-61.8	54.0	13	12	32	44		Sat.		-57.8 50.0 **RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF FINE TO COARSE SAND LAYERS
-66.8	59.0	24	21	24	45		Sat.		
-71.8	64.0	35	27	50	77		Sat.		
		58	42/0.2		100/0.7		Sat.		

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. NASH
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B16-B	**BORING LOCATION** 33+69	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -7.8 ft	**NORTHING** 498,223.9	**EASTING** 2,587,182.5		**24 HR.** N/A
TOTAL DEPTH 80.5 ft	**DRILL MACHINE** BK-51	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** AUTOMATIC
DATE STARTED 11/10/05	**COMPLETED** 11/11/05	**SURFACE WATER DEPTH** 17.4 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.9					Continued from previous page				
-76.8	69.0								
-81.8	74.0	30	35	26	61		Sat.		**RIVER BEND FORMATION:** MODERATELY INDURATED TO EXTREMELY INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF FINE TO COARSE SAND LAYERS *(continued)*
-86.8	79.0	33	27	30	57		Sat.		
		40	45	32	77		Sat.		-88.3 80.5
					BORING TERMINATED AT ELEV. -88.3 FEET IN INDURATED GRAY MOLDIC LIMESTONE.				1) ADVANCED NW CASING TO 53.6 FEET. 2) SET NW CASING TO 53.6 FEET(TEMP CASING 24.1 FEET). 3) ADVANCED 2-7/8" TRICONE ROLLER TO 79.0 FEET. 4) RIVER WATER USED WITH QUICKGEL ADDED AS DRILLING FLUID. 5) APPROXIMATE DRILLING FLUID DENSITY 66 PCF. 6) DRILLING FLUID LOSS OBSERVED BETWEEN 64 TO 79 FEET.

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B17-B	**BORING LOCATION** 34+36	**OFFSET** 22.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -6.4 ft	**NORTHING** 498,287.4	**EASTING** 2,587,208.1		**24 HR.** N/A
TOTAL DEPTH 80.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/14/05	**COMPLETED** 11/14/05	**SURFACE WATER DEPTH** 5.3 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.1					RIVER LEVEL		▽		
					RIVER BOTTOM				-6.4 / 0.00
-8.7	2.3						W		**ALLUVIUM:** VERY SOFT TO SOFT BROWN HIGHLY ORGANIC FINE SANDY SILT (MUCK)
		WOH	WOH	WOH	WOH				
-13.7	7.3						W		-16.4 / 10.0
		WOH	2	2	4				LOOSE GRAY SLIGHTLY SILTY FINE SAND (A-3)
-18.7	12.3						Sat.		-21.4 / 15.0
		3	3	2	5				MEDIUM STIFF GRAY FINE SANDY SILT (A-4)
-23.7	17.3						W		-26.4 / 20.0
		3	2	3	5				LOOSE GRAY SILTY FINE SAND (A-2-4)
-28.7	22.3						Sat.		-29.7 / 23.3
		3	7	10	17				**BELGRADE FORMATION:** MEDIUM DENSE TAN-GRAY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS
-33.7	27.3						Sat.		-37.4 / 31.0
		10	10	12	22				FRIABLE THINLY BEDDED TAN-GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-38.7	32.3						Sat.		-42.4 / 36.0
		10	13	14	27				MEDIUM DENSE GRAY SILTY FINE TO COARSE SAND (A-1-b)
-43.7	37.3						Sat.		-45.2 / 38.8
		11	14	13	27				WITH FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE LAYERS
-49.9	43.5						Sat.		FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
		14	15	14	29				
-54.9	48.5						Sat.		-56.4 / 50.0
		18	15	17	32				MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-59.9	53.5								-59.1 / 52.7
		63	37/0.4		100/0.9		Sat.		**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.9	58.5								
		26	33	29	62				
-69.9	63.5						Sat.		
		75	25/0.2		100/0.7				
-74.9	68.5						Sat.		
		36	29	37	66				

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B17-B	**BORING LOCATION** 34+36	**OFFSET** 22.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -6.4 ft	**NORTHING** 498,287.4	**EASTING** 2,587,208.1		**24 HR.** N/A
TOTAL DEPTH 80.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/14/05	**COMPLETED** 11/14/05	**SURFACE WATER DEPTH** 5.3 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-75.9					Continued from previous page				
-79.9	73.5						Sat.		**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
		29	34	44	78				
-84.9	78.5						Sat.		-86.4 / 80.0
		32	23	26	49				
					BORING TERMINATED AT ELEV. -86.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE				

1) ADVANCED NW CASING TO 37.3 FEET.
2) SET NW CASING TO 37.3 FEET (TEMP CASING 6.4 FEET).
3) ADVANCED NWD4 CORE BARREL FROM 38.8 TO 78.5 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) APPROXIMATE DRILLING FLUID DENSITY 65 PCF.
6) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 50.0 FEET.

NCDOT BORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

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N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

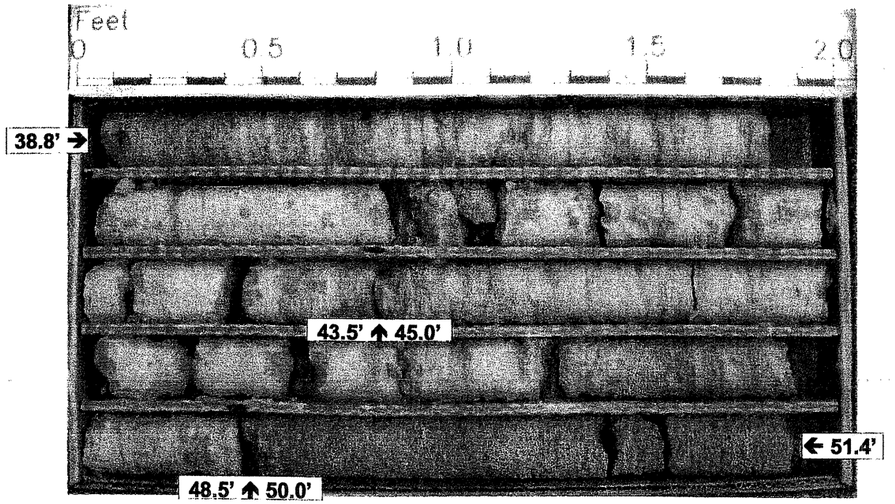
PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B17-B	**BORING LOCATION** 34+36	**OFFSET** 22.0 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. -6.4 ft	**NORTHING** 498,287.4	**EASTING** 2,587,208.1	**24 HR.** N/A
TOTAL DEPTH 80.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary Wash w/NW Casing/NWD4 Core Barrel	**HAMMER TYPE** MANUAL
DATE STARTED 11/14/05	**COMPLETED** 11/14/05	**SURFACE WATER DEPTH** 5.3 ft	
CORE SIZE NWD4	**TOTAL RUN** 41.2 ft	**DRILLER** A. MARTIN	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										-45.2 Begin Coring @ 38.8 ft 38.8
-45.2	38.8	4.7	1:15 1:05 1:20 1:15 0:40/0.7	(4.6) 98%	(N/A)		(8.0) 71%			**BELGRADE FORMATION:** FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-49.9	43.5		*N=29*							
-51.4	45.0	3.5	1:05 1:15 1:20 0:40/0.5	(3.4) 97%	(N/A)					
-54.9	48.5		*N=32*							-56.4 50.0
-56.4	50.0	3.5	1:20 1:20 1:10 0:45/0.5	(3.3) 94%	(N/A)		(2.5) 93%			MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-59.9	53.5									-59.1 52.7
-60.8	54.4	4.1	*N=100/0.9* 2:00 2:30 2:45 3:00	(4.0) 98%	(N/A)		(19.2) 70%			**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.9	58.5									
-66.4	60.0	3.5	0:05/0.1	(3.3) 94%	(N/A)					
-69.9	63.5		*N=62*							
-70.6	64.2	4.3	2:45 3:00 3:00 1:50/0.5	(4.1) 95%	(N/A)					
-74.9	68.5		*N=100/0.1*							
-76.4	70.0	3.5	1:45 1:50 1:50 1:30 1:00/0.3	(3.5) 100%	(N/A)					
-79.9	73.5		*N=66*							
-81.4	75.0	3.5	2:30 2:40 3:00 1:40/0.5	(3.5) 100%	(N/A)					
-84.9	78.5		*N=78*							
-86.4	80.0		2:00 2:10 2:05 1:40/0.5							-86.4 80.0 BORING TERMINATED AT ELEV. -86.4 FEET IN INDURATED GRAY MOLDIC LIMESTONE.
			N=49							

NCDOT CORE SINGLE 05-478NEW2TOM.GPJ NCDOT.GDT 12/2/05

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B17-B
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -6.4 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -86.4 ft.	*Total Depth:* 80.0 ft.	*Total Run:* 41.2 ft.	*Date*: 11/14/2005



Box 1 of 4

Top of Box @ 38.8 feet; Bottom of Box @ 51.4 feet

Box 2 of 4

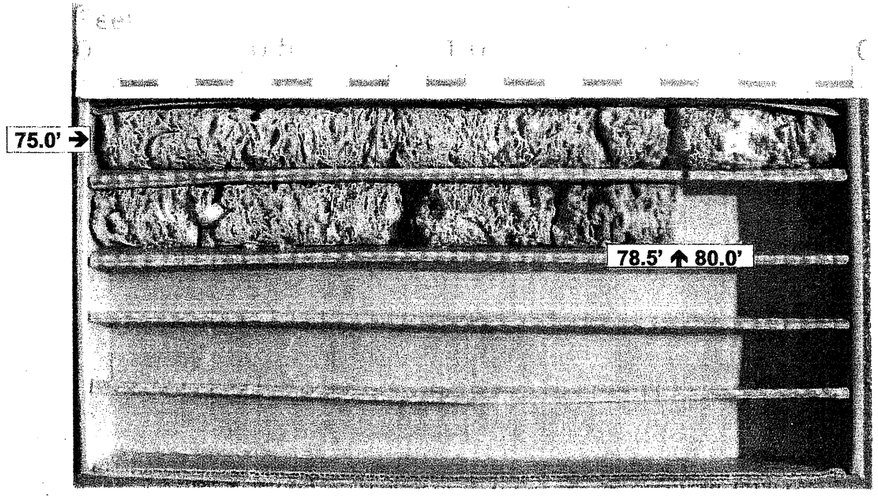
Top of Box @ 51.4 feet; Bottom of Box @ 63.5 feet

CORE PHOTOS

Project No.: 32649.1.1	*ID No.:* B-2532	*County:* Craven	*Boring No.:* B17-B
Site Description: Bridge No. 60 over Trent River on US 70 Business			*Driller*: A. Martin
Collar Elev.: -6.4 ft.	*Core Size:* NWD4	*Equipment:* CME-45c	*Geologist*: S. Johnson
Elev. at T.D.: -86.4 ft.	*Total Depth:* 80.0 ft.	*Total Run:* 41.2 ft.	*Date*: 11/14/2005

Box 3 of 4

Top of Box @ 64.2 feet; Bottom of Box @ 73.5 feet



Box 4 of 4

Top of Box @ 75.0 feet; Bottom of Box @ 80.0 feet

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** A. RIGGS
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. B18-B	**BORING LOCATION** 35+08	**OFFSET** 9.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -2.2 ft	**NORTHING** 498,360.5	**EASTING** 2,587,208.1		**24 HR.** N/A
TOTAL DEPTH 68.4 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** Rotary Wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/3/05	**COMPLETED** 11/3/05	**SURFACE WATER DEPTH** 1.9 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-0.3					RIVER LEVEL		▽		
-2.2	0.0				RIVER BOTTOM				-2.2 0.00
-4.9	2.7	1	1	WOH	1		Sat.		**ALLUVIUM:** VERY LOOSE DARK GRAY TO BROWN SILTY FINE SAND (A-2-4) WITH LITTLE ORGANIC MATTER ORGANIC CONTENT 4.4%
-9.6	7.4	1	WOH	WOH	WOH	SS-14	Sat.		
-14.6	12.4	1	WOH	1	1		Sat.		-14.2 12.0
-19.6	17.4	2	3	5	8		Sat.		LOOSE TO MEDIUM DENSE GRAY-BROWN SLIGHTLY SILTY FINE SAND (A-3) WITH WOOD
-24.6	22.4	9	15	14	29		Sat.		-21.2 19.0
-29.6	27.4	1	WOH	5	5		W		VERY SOFT DARK GRAY CLAYEY FINE SANDY SILT (A-4)
-34.6	32.4	12	14	12	26		Sat.		-25.6 23.4
-39.6	37.4	11	13	13	26		Sat.		LOOSE GRAY SILTY FINE SAND (A-2-4) WITH TRACE OF SHELL MATERIAL AND LIMESTONE FRAGMENTS
-44.7	42.5	8	14	15	29		Sat.		-28.7 26.5
-49.7	47.5	14	12	14	26		Sat.		**BELGRADE FORMATION:** MEDIUM DENSE TAN SLIGHTLY CLAYEY SLIGHTLY SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN SANDY LIMESTONE
-54.7	52.5	13	13	16	29		Sat.		-36.7 34.5
-59.7	57.5	16	17	17	34		Sat.		FRIABLE TO MODERATELY INDURATED VERY THINLY TO THINLY BEDDED TAN SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-64.7	62.5	100/0.4			100/0.4		Sat.		-43.2 41.0
-69.7	67.5	38	60	40/0.4	100/0.9		Sat.		FRIABLE TO MODERATELY INDURATED VERY THINLY TO THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
		57	43/0.4		100/0.9		Sat.		-57.2 55.0
					BORING TERMINATED AT ELEV. -70.6 FEET IN EXTREMELY INDURATED GRAY MOLDIC LIMESTONE				**RIVER BEND FORMATION:** INDURATED TO EXTREMELY INDURATED THINLY TO THICKLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
									-70.6 68.4

1) ADVANCED NW CASING TO 36.8 FEET.
2) SET NW CASING TO 36.8 FEET (TEMP CASING 15.4 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER FROM 36.8 TO 67.5 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) SOME LOSS OF DRILLING FLUID OBSERVED BELOW 55.0 FEET.
6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

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BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 35+92	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 10.6 ft	**NORTHING** 498,446.4	**EASTING** 2,587,205.3	**24 HR.** N/M
TOTAL DEPTH 75.0 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** 3-1/4" HSA/Rotary Wash w/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/31/05	**COMPLETED** 10/31/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
10.6									ASPHALT PAVEMENT SURFACE 0.00
							M		**ROADWAY EMBANKMENT FILL:** MEDIUM DENSE TAN-BROWN FINE TO COARSE SAND (A-1-b) WITH TRACE OF SILT
6.7	3.9	6	8	11	19				10.6
							W		**ALLUVIUM:** VERY LOOSE TO LOOSE GRAY TO DARK GRAY SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE OF ORGANIC MATTER
1.7	8.9	1	1	1	2				2.6
							Sat.		8.0
-3.3	13.9	4	2	2	4				-6.4
							Sat.		MEDIUM DENSE GRAY FINE SAND (A-3) WITH TRACE OF SILT 17.0
-8.3	18.9	5	8	9	17				-11.4
							Sat.		LOOSE GRAY AND BROWN SILTY FINE SAND (A-2-4) WITH LITTLE ORGANIC MATTER AND PIECES OF WOOD 22.0
-12.9	23.5	2	3	2	5				-16.4
							W		SOFT GRAY CLAYEY FINE SANDY SILT (A-4) 27.0
-17.9	28.5	2	1	2	3				-21.9
							Sat.		LOOSE TAN SILTY FINE TO COARSE SAND (A-1-b) WITH TRACE OF LIMESTONE FRAGMENTS 32.5
-22.9	33.5	2	4	5	9				
							Sat.		
-27.9	38.5	7	2	6	8				-31.4
							Sat.		**BELGRADE FORAMTION:** MEDIUM DENSE GRAY SILTY FINE SAND (A-1-b) WITH TRACE OF FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE 42.0
-32.9	43.5	9	11	12	23				-36.4
							Sat.		FRIABLE TO MODERATELY INDURATED THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS 47.0
-37.9	48.5	12	13	11	24				-41.4
							Sat.		FRIABLE TO MODERATELY INDURATED VERY THINLY TO THINLY BEDDED GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS 52.0
-42.9	53.5	12	12	14	26				
							Sat.		
-47.9	58.5	13	13	14	27				
							Sat.		
-52.9	63.5	17	17	15	32				
							Sat.		-58.4 69.0
-57.9	68.5	13	45	55/0.3	100/0.8				**RIVER BEND FORMATION:** MODERATELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF SAND LAYERS
-62.9	73.5	22	47	27	74		Sat.		-64.4 75.0

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BORING LOG

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 35+92	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 10.6 ft	**NORTHING** 498,446.4	**EASTING** 2,587,205.3	**24 HR.** N/M
TOTAL DEPTH 75.0 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** 3-1/4" HSA/Rotary Wash w/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 10/31/05	**COMPLETED** 10/31/05	**SURFACE WATER DEPTH** N/A	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-64.2					Continued from previous page				-64.4 75.0
					BORING TERMINATED AT ELEV. -64.4 FEET IN MODERATELY INDURATED GRAY MOLDIC LIMESTONE				1) ADVANCED 3-1/4" HSA TO 18.5 FEET. 2) ADVANCED 2-7/8" TRICONE ROLLER TO 73.5 FEET. 3) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID. 4) APPROXIMATE DRILLING FLUID DENSITY 65 PCF. 5) LOSS OF DRILLING FLUID OBSERVED BELOW 33.5 FEET.

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SHEET 1 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. BTP- 1	**BORING LOCATION** 32+63	**OFFSET** 48.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.5 ft	**NORTHING** 498,129.5	**EASTING** 2,587,168.5	**24 HR.** N/A
TOTAL DEPTH 78.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/16/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 10.8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-1.7					RIVER LEVEL		▽		
					RIVER BOTTOM				-12.5 / 0.00
-14.4	1.9								**ALLUVIUM:** VERY SOFT TO SOFT BLACK HIGHLY ORGANIC FINE SANDY SILT (MUCK)
		2	WOH	WOH	WOH		W		
-19.4	6.9	2	2	2	4		W		
-23.3	10.8								VERY LOOSE TO LOOSE GRAY COARSE TO FINE SAND (A-3) WITH TRACE OF SILT AND LIMESTONE FRAGMENTS
-24.4	11.9	2	1	2	3		Sat.		
-29.4	16.9	6	5	4	9		Sat.		
-34.4	21.9								**BELGRADE FORMATION:** MEDIUM DENSE TAN SILTY FINE TO COARSE SAND (A-1-b) WITH MODERATELY INDURATED THINLY BEDDED TAN SANDY LIMESTONE LAYERS
		13	11	13	24		Sat.		
-39.0	26.5	11	11	10	21		Sat.		
-43.5	31.0								FRIABLE TO MODERATELY INDURATED THINLY BEDDED TAN TO GRAY SANDY LIMESTONE WITH TRACE OF THIN SAND LAYERS
-44.0	31.5	21	23	22	45		Sat.		
-49.0	36.5	17	18	15	33		Sat.		
-54.0	41.5	19	19	21	40		Sat.		
-59.0	46.5								**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS
-59.5	47.0	17	83/0.3		100/0.8		Sat.		
-64.0	51.5	30	45	55	100		Sat.		
-69.0	56.5	43	57/0.3		100/0.8		Sat.		
-74.0	61.5	20	50	30	80		Sat.		

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BORING LOG

SHEET 2 OF 2

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** N. Bradley
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**
BORING NO. BTP- 1	**BORING LOCATION** 32+63	**OFFSET** 48.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -12.5 ft	**NORTHING** 498,129.5	**EASTING** 2,587,168.5	**24 HR.** N/A
TOTAL DEPTH 78.0 ft	**DRILL MACHINE** CME-45c	**DRILL METHOD** Rotary wash w/NW Casing/2-7/8" Tricone Roller	**HAMMER TYPE** MANUAL
DATE STARTED 11/16/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 10.8 ft	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-76.5					Continued from previous page				
-79.0	66.5						Sat.		**RIVER BEND FORMATION:** EXTREMELY INDURATED TO INDURATED THINLY BEDDED GRAY MOLDIC LIMESTONE WITH TRACE OF THIN SAND LAYERS *(continued)*
		50	47	43	90				
-84.0	71.5	32	39	42	81		Sat.		
-89.0	76.5								
		30	31	53	84		Sat.		
					BORING TERMINATED AT ELEV. -90.5 FEET IN EXTREMELY INDURATED TO INDURATED GRAY MOLDIC LIMESTONE				-90.5 / 78.0

1) ADVANCED NW CASING TO 21.9 FEET.
2) SET NW CASING TO 21.9 FEET (TEMP CASING 11.9 FEET).
3) ADVANCED 2-7/8" TRICONE ROLLER TO 76.5 FEET.
4) RIVER WATER WITH QUICKGEL ADDED USED AS DRILLING FLUID.
5) NO LOSS OF DRILLING FLUID OBSERVED.
6) APPROXIMATE DRILLING FLUID DENSITY 66 PCF.

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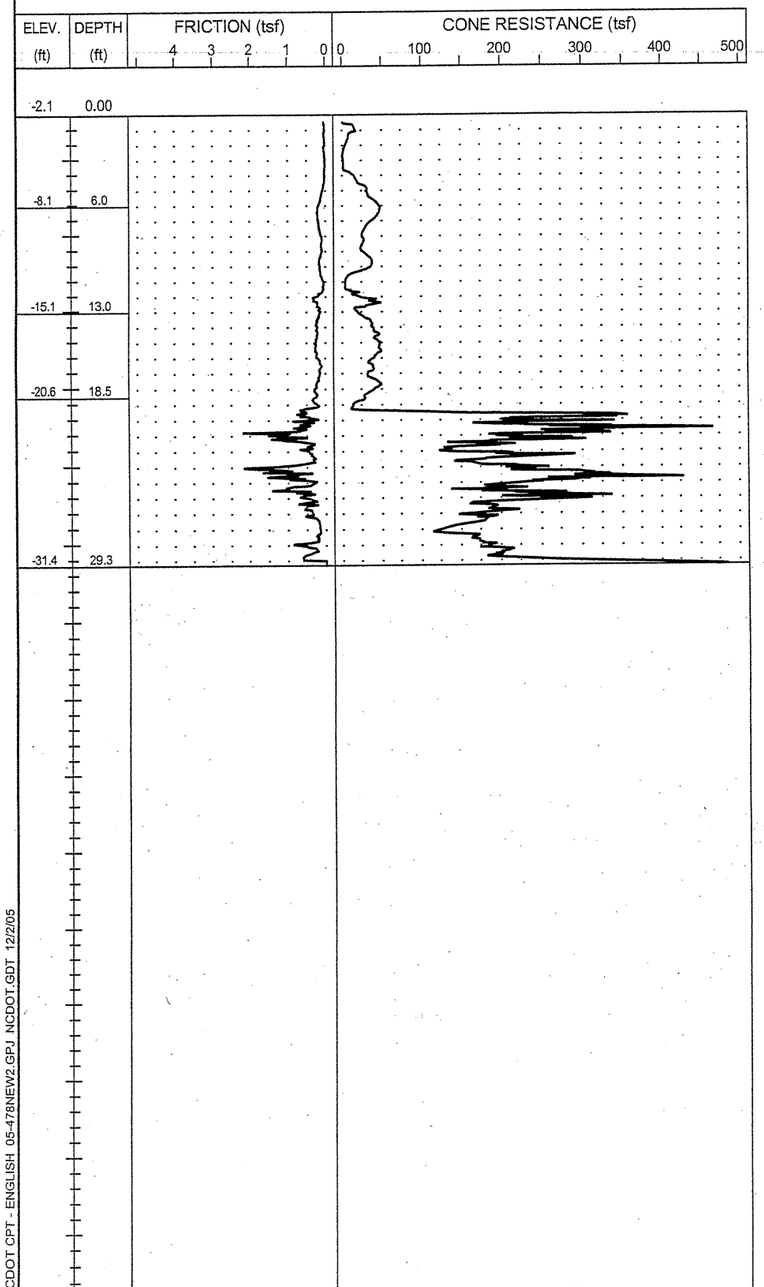
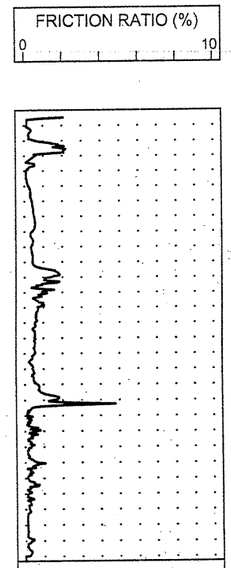
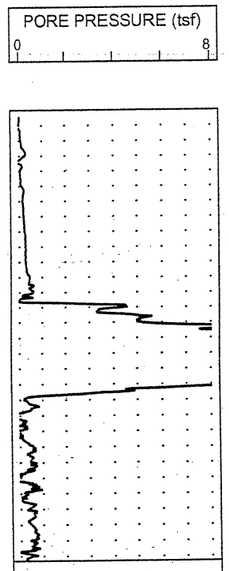
BORING LOG

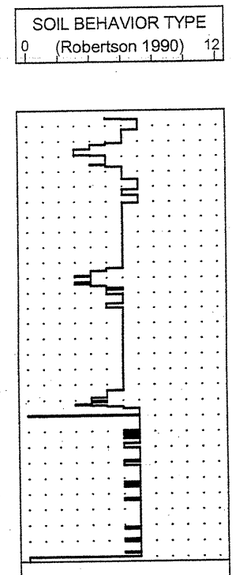
SHEET 1 OF 1

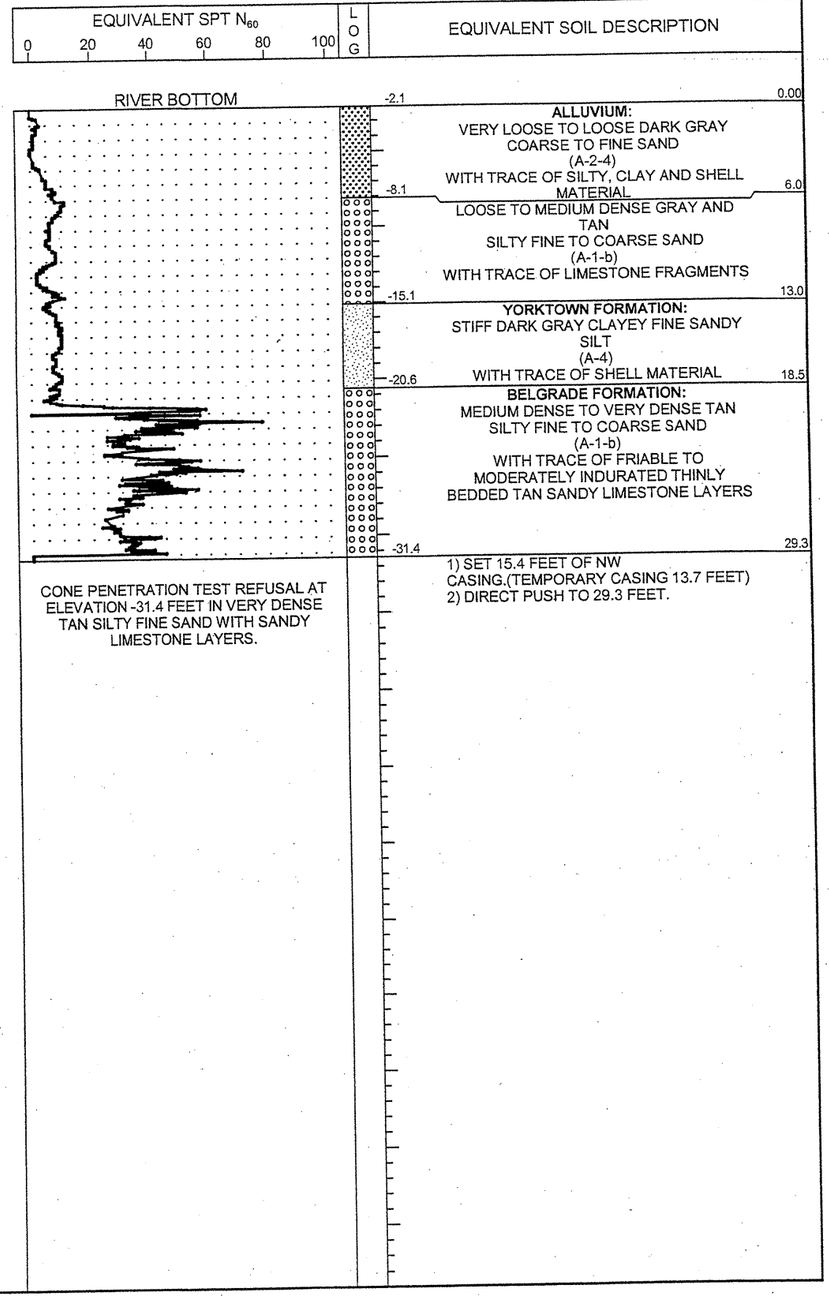
PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON		**TYPE OF CONE** 1.75 sq. In. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River				**GROUND WATER (ft)**	**TOTAL DEPTH** 29.3 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 1	**BORING LOCATION** 19+15	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/16/05	**COMPLETED** 11/16/05	**SURFACE WATER DEPTH** 1.5 ft	
COLLAR ELEV. -2.1 ft	**NORTHING** 496,793.3	**EASTING** 2,586,924.4		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE		











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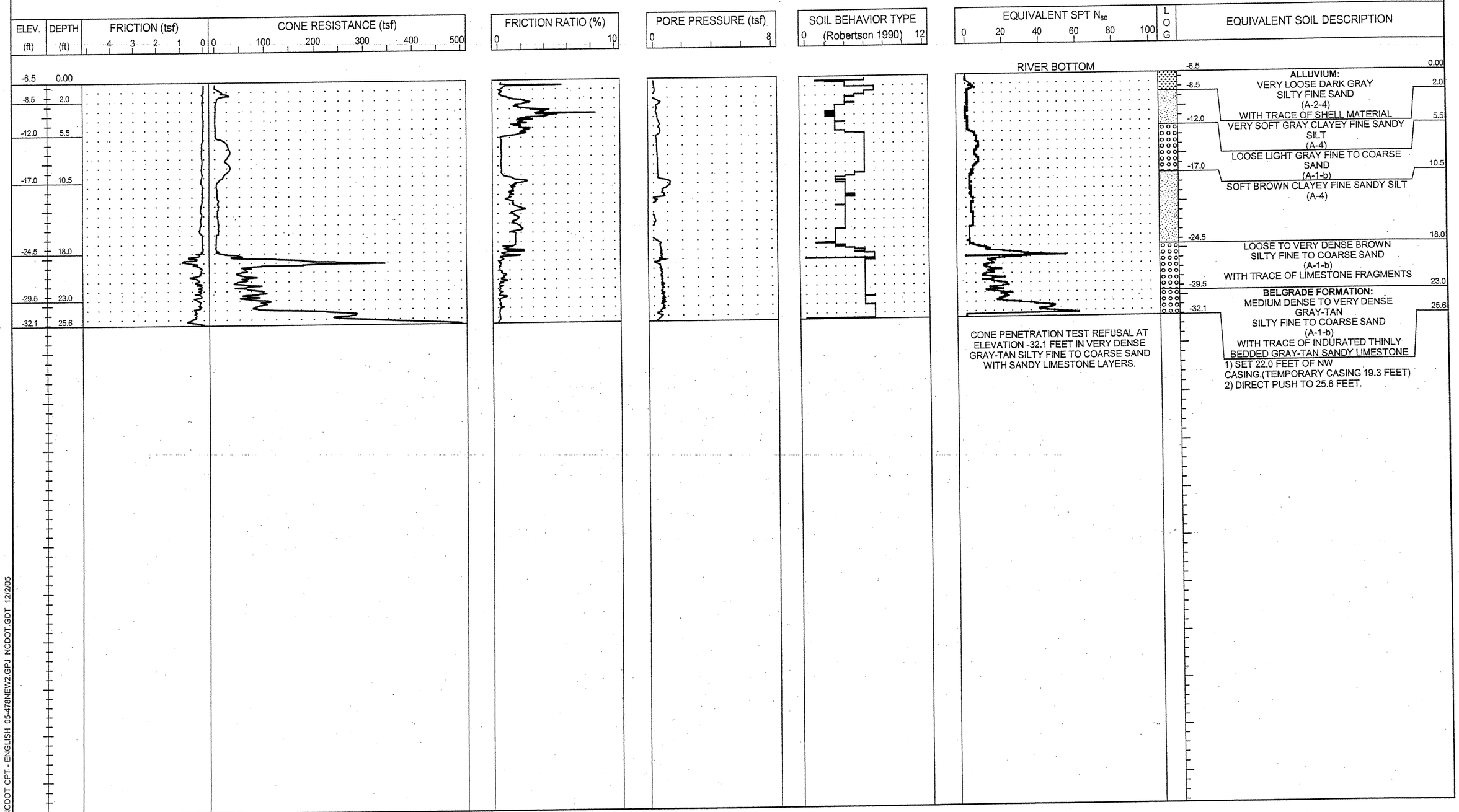
BORING LOG

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON	**TYPE OF CONE** 1.75 sq. In. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf	
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**	**TOTAL DEPTH** 25.6 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 2	**BORING LOCATION** 21+10	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 6.3 ft
COLLAR ELEV. -6.5 ft	**NORTHING** 496,985.2	**EASTING** 2,586,959.0		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE	



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BORING LOG

SHEET 1 OF 1

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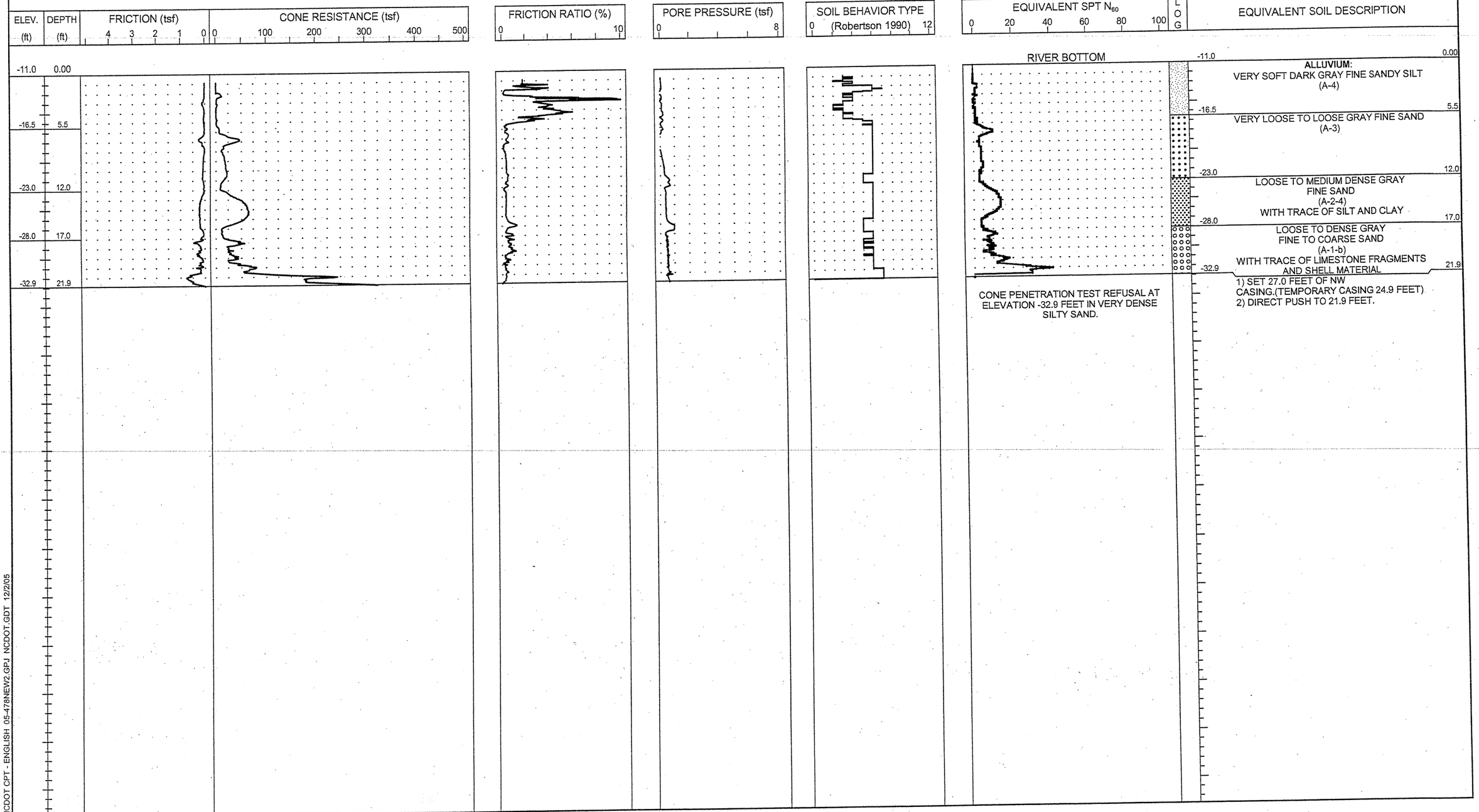
PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON	**TYPE OF CONE** 1.75 sq. In. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf	
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**	**TOTAL DEPTH** 21.9 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 3	**BORING LOCATION** 22+90	**OFFSET** 9.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 10.8 ft
COLLAR ELEV. -11.0 ft	**NORTHING** 497,162.2	**EASTING** 2,586,992.0		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE	



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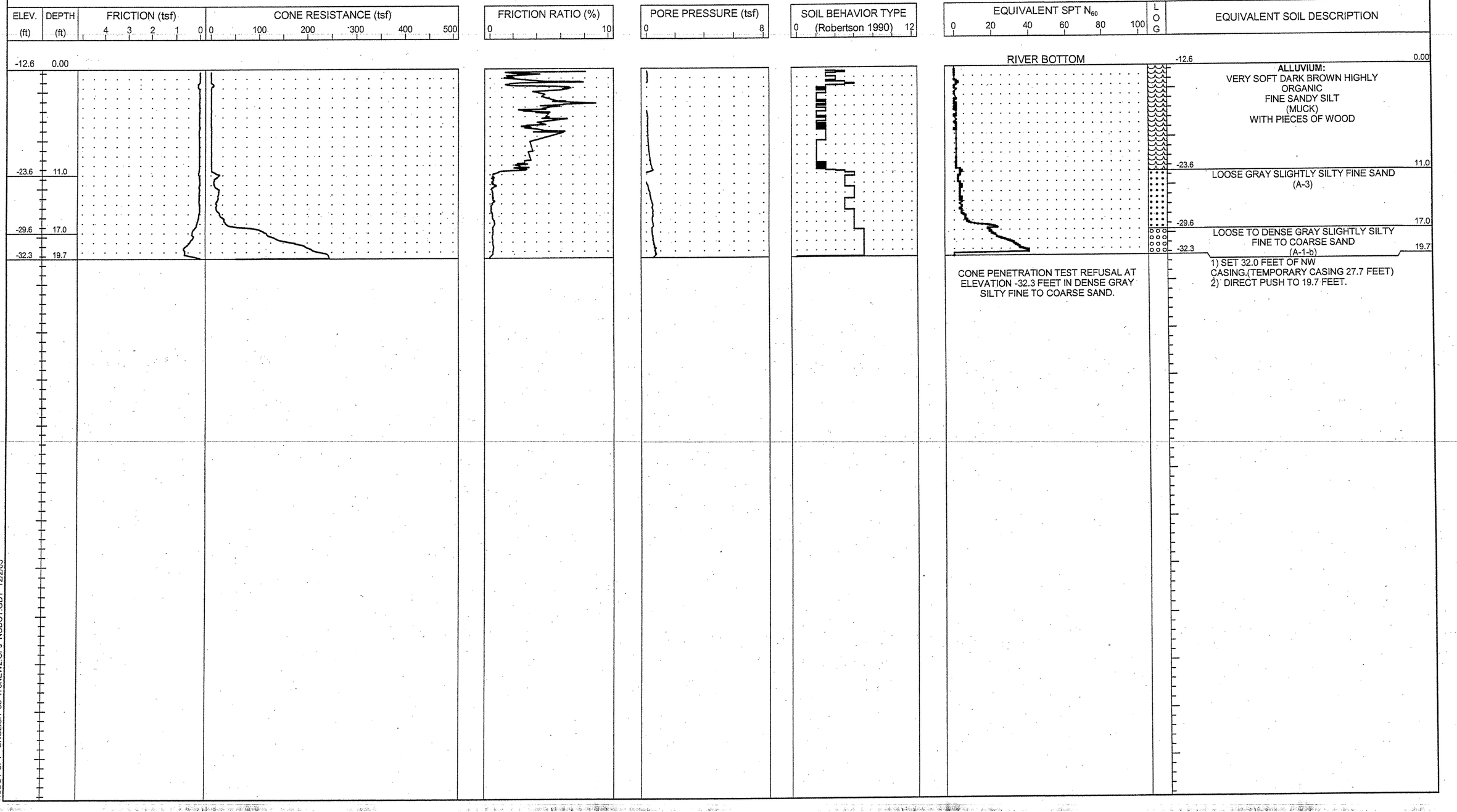
BORING LOG

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON	**TYPE OF CONE** 1.75 sq. in. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf	
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**	**TOTAL DEPTH** 19.7 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 4	**BORING LOCATION** 24+77	**OFFSET** 8.0 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 12.4 ft
COLLAR ELEV. -12.6 ft	**NORTHING** 497,346.4	**EASTING** 2,587,024.2		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE	



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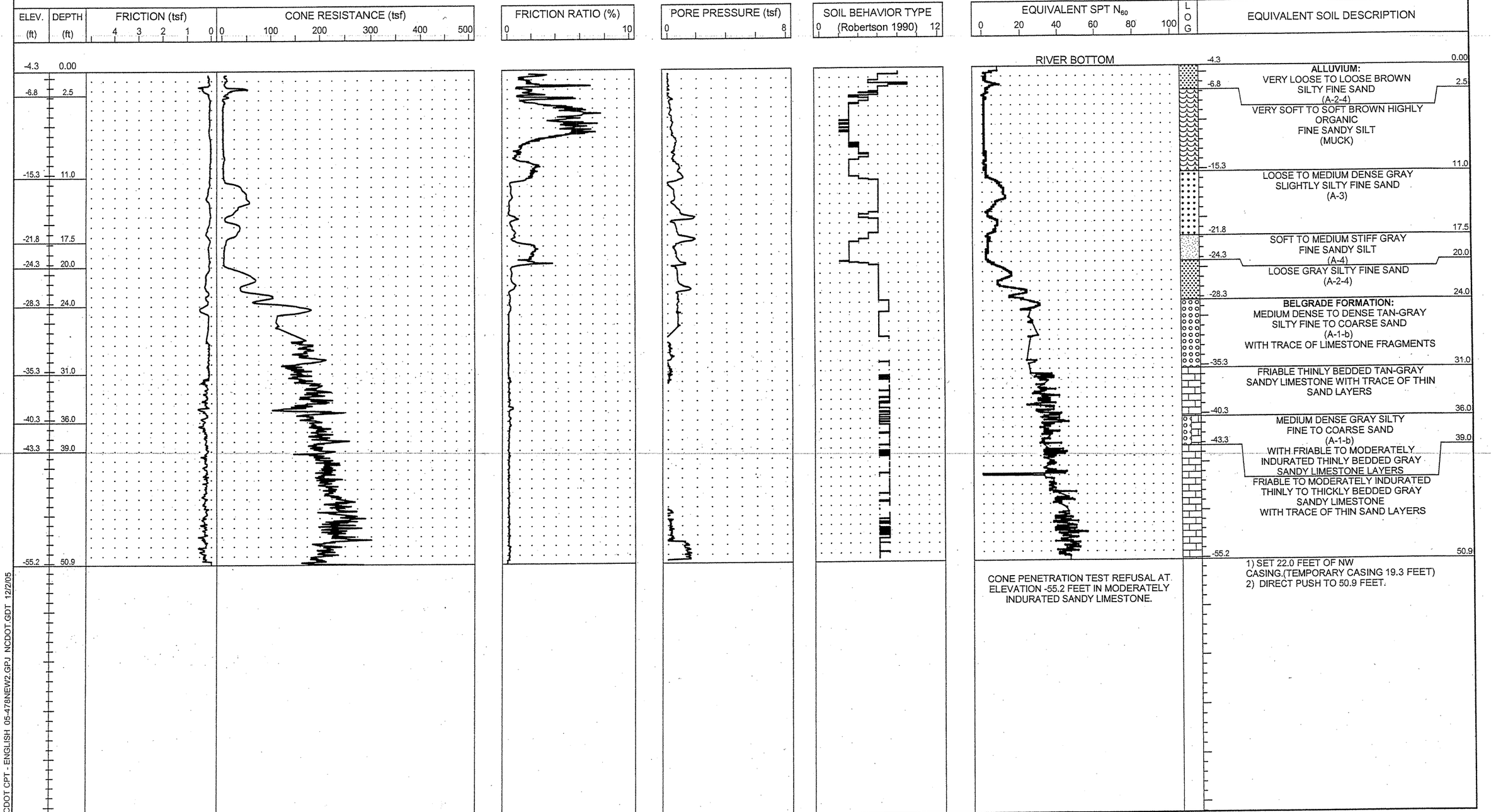
BORING LOG

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON	**TYPE OF CONE** 1.75 sq. In. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf	
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**	**TOTAL DEPTH** 50.9 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 5	**BORING LOCATION** 34+37	**OFFSET** 9.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** 4.1 ft
COLLAR ELEV. -4.3 ft	**NORTHING** 498,294.2	**EASTING** 2,587,177.9		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE	



RIVER BOTTOM

-4.3 0.00 **ALLUVIUM:**
VERY LOOSE TO LOOSE BROWN
SILTY FINE SAND
(A-2-4)

-6.8 2.5 VERY SOFT TO SOFT BROWN HIGHLY
ORGANIC
FINE SANDY SILT
(MUCK)

-15.3 11.0 LOOSE TO MEDIUM DENSE GRAY
SLIGHTLY SILTY FINE SAND
(A-3)

-21.8 17.5 SOFT TO MEDIUM STIFF GRAY
FINE SANDY SILT
(A-4)

-24.3 20.0 LOOSE GRAY SILTY FINE SAND
(A-2-4)

-28.3 24.0 **BELGRADE FORMATION:**
MEDIUM DENSE TO DENSE TAN-GRAY
SILTY FINE TO COARSE SAND
(A-1-b)
WITH TRACE OF LIMESTONE FRAGMENTS

-35.3 31.0 FRIABLE THINLY BEDDED TAN-GRAY
SANDY LIMESTONE WITH TRACE OF THIN
SAND LAYERS

-40.3 36.0 MEDIUM DENSE GRAY SILTY
FINE TO COARSE SAND
(A-1-b)

-43.3 39.0 WITH FRIABLE TO MODERATELY
INDURATED THINLY BEDDED GRAY
SANDY LIMESTONE LAYERS
FRIABLE TO MODERATELY INDURATED
THINLY TO THICKLY BEDDED GRAY
SANDY LIMESTONE
WITH TRACE OF THIN SAND LAYERS

-55.2 50.9

CONE PENETRATION TEST REFUSAL AT ELEVATION -55.2 FEET IN MODERATELY INDURATED SANDY LIMESTONE.

1) SET 22.0 FEET OF NW CASING.(TEMPORARY CASING 19.3 FEET)
2) DIRECT PUSH TO 50.9 FEET.

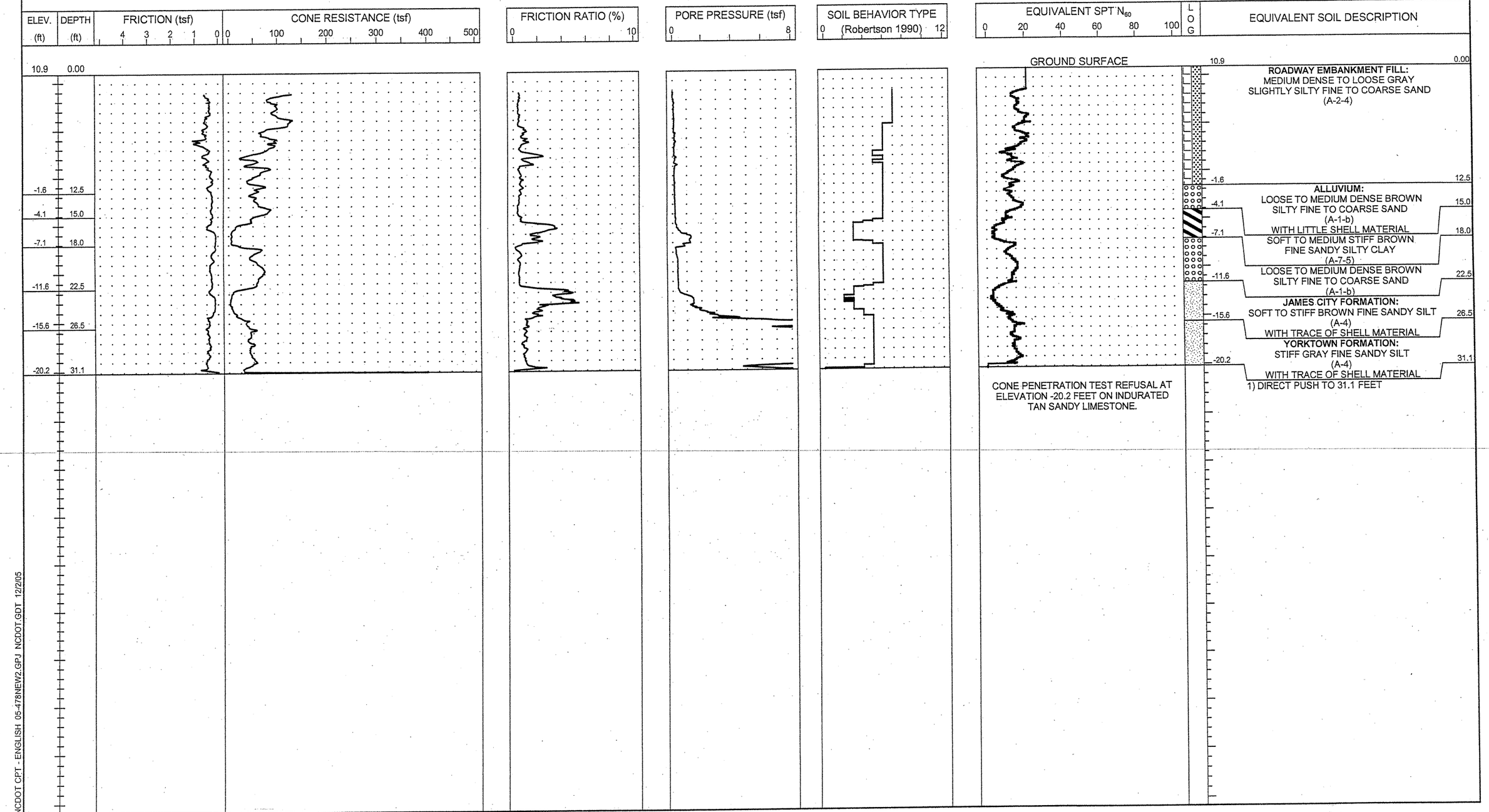
NCDOT CPT - ENGLISH 05-478NEW2.GPJ NCDOT.GDT 12/2/05

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 32649.1.1	**ID.** B-2532	**COUNTY** Craven	**GEOLOGIST** S. JOHNSON	**TYPE OF CONE** 1.75 sq. In. PEIZO CONE	**ROD TYPE** 1.75 in Dia.	**MAXIMUM DOWN PRESSURE** Approximately 20 tsf	
SITE DESCRIPTION Bridge 60 on US 70 Business over Trent River			**GROUND WATER (ft)**	**TOTAL DEPTH** 31.1 ft	**DRILL MACHINE** CPT Truck	**DRILL METHOD** Direct Push	**HAMMER TYPE** N/A
BORING NO. CPT- 6	**BORING LOCATION** 18+10	**OFFSET** 12.0 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A	**DATE STARTED** 11/17/05	**COMPLETED** 11/17/05	**SURFACE WATER DEPTH** N/A
COLLAR ELEV. 10.9 ft	**NORTHING** 496,693.5	**EASTING** 2,586,886.4		**24 HR.** N/A	**DRILLER:** A. MARTIN	**TECHNICIAN** J. WHITE	



SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

Boring No.	Sample No.	Sample Depth Feet	AASHTO Classification		% Passing Sieve # 10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay	LL	PL	PI	Organic Content %	Moisture Content %
EB1-B	SS-1	8.8-10.3	A-2-4	(0)	91	72	56	26	39	38	7	16	23	17	6	N.A.	N.A.
B1-A	SS-2	0.0-1.5	A-2-4	(0)	100	96	86	12	14	78	3	5	24	N.P.	N.P.	N.A.	N.A.
B2-B	SS-3	13.5-15.0	A-4	(1)	99	93	91	52	8	56	17	19	23	15	8	N.A.	N.A.
B3-A	SS-4	4.8-6.3	A-3	(0)	99	51	18	4	82	15	0	3	21	N.P.	N.P.	N.A.	N.A.
B4-B	SS-5	7.2-8.7	A-4	(0)	100	97	91	37	9	66	10	15	20	N.P.	N.P.	N.A.	N.A.
B5-A	SS-6	14.8-16.3	A-2-4	(0)	100	100	92	11	8	85	2	5	24	N.P.	N.P.	N.A.	N.A.
B6-B	SS-7	6.1-7.6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	39.6	N.A.
B7-A	SS-8	1.1-2.6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	24.7	N.A.
B7-A	SS-9	15.1-16.6	A-3	(0)	98	98	84	8	15	81	1	3	24	N.P.	N.P.	N.A.	N.A.
B8-B	SS-10	20.5-22.0	A-4	(1)	100	100	99	50	1	63	16	20	24	17	7	N.A.	26.4
B9-A	SS-11	18.6-20.1	A-2-4	(0)	100	100	89	16	12	80	3	5	22	N.P.	N.P.	N.A.	N.A.
B10-B	SS-12	30.0-31.5	A-1-b	(0)	100	47	31	18	69	15	8	8	20	N.P.	N.P.	N.A.	N.A.
B14-A	SS-13	5.1-6.6	N.A.	N.A.	65	52	41	16	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	9.7	N.A.
B18-B	SS-14	2.7-4.2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	4.4	N.A.

N.A.: Not Analyzed
N.P.: Non Plastic

Project Name: Bridge 60 Over the Trent River on US 70 Business
S&ME Project No.: 1051-05-478
State Project No.: 32649.1.1
County: Craven
Federal ID No.: N/A
TIP No.: B-2532
Checked By: JSJ & AFR

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 32649.1.1 ID: B-2532 COUNTY: Craven

DESCRIPTION(1): Bridge 60 Over The Trent River on US 70 Business

INFORMATION ON EXISTING BRIDGES Information obtained from:
__x__ field inspection
____ microfilm(Reel: ____Pos: __)
__x__ other Preliminary General Drawings

COUNTY BRIDGE NO. 60 BRIDGE LENGTH 1762.4' NO. BENTS IN: CHANNEL 43 FLOOD PLAIN _____ 3

FOUNDATION TYPE: Pre-stressed 22 Inch Octagonal Concrete Piles

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: No significant signs of eroison at the end bents.

INTERIOR BENTS: None observed at Interior Bent No. 1. Minor erosion observed at Interior Bent No.45. None observed at the remainder of the Interior Bents due to bents being located in the channel. Concrete has been cast in-place to repair a concrete pile located at Interior Bent No. 45 on the left side of the bent.

CHANNEL BED: None observed

CHANNEL BANKS: None observed

EXISTING SCOUR PROTECTION:

TYPE(3): Concrete abutments with concrete wingwalls. A timber retaining wall with concrete cap is located between Interior Bent No. 1 and Interior Bent No. 2. A timber retaining wall with concrete cap is located between End Bent No. 2 and Interior Bent No. 45. Rip Rap has been placed between the abutment and the top of the retaining walls.

EXTENT(4): Concrete wingwalls extend a few feet beyond the concrete abutments. The retaing walls extends approximately 40 to 45 feet left and wraps around to approximatley 40 to 45 feet beyond each end of the bridge. Rip Rap has been placed between the abutments and the top of the retaining walls

EFFECTIVENESS(5): Relatively effective with some minor erosion at both abutments.

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Pedestrian bridge crosses beneath the existing bridge between Interior Bent No.43 and Interior Bent 44. Retaining walls at both ends of the bridge. Bridge fender system upstream and downstream of main channel.

DESIGN INFORMATION:

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Dark gray silty coarse to fine sand (A-2-4) with trace of shell material, brown slighlty silty fine sand (A-3) with little organic matter, dark gray and brown highly organic fine sandy and and clayey silt (Muck), gray fine sand (A-3) with trace of silt, gray clayey silt (A-4), gray silty fine to coarse sand (A-2-4), brown fine sandy silt (A-4), brown moderately organic silty fine sand (A-2-4)

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Brown, gray and tan silty fine to coarse sand (A-1-b) with trace of shell materials and limestone fragments, dark gray silty coarse to fine sand (A-2-4) with trace of shell materal and organic material

CHANNEL BANK COVER(9): Commerical development is located on each side of the river.

FLOOD PLAIN WIDTH(10): 500 +/- feet on the north side of the river and 1500 +/- feet on the south side of the river

FLOOD PLAIN COVER(11): Commerical development is located on each side of the river.

DESIGN INFORMATION CONT. PAGE 2

STREAM IS __x__ DEGRADING _____ AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS: A water line is buried beneath the river bottom 40 to 50 feet left of the existing bridge. A fiber optic cable is attached beneath the right side of the bridge, then goes along the river bottom around the right side of the finder system at the channel crosssing. Marina located southwest of bridge and Union Point Park is located northeast of the bridge. Convention Center is located northwest of bridge.

CHANNEL MIGRATION TENDENCY (13): Migration tendency to the north

REPORTED BY: J. Shane Johnson S&ME, Inc. DATE: 11/12/2005

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (14):

The Geotechnical Unit agrees with the theoretical scour shown on the Bridge Survey and Hydraulic Design report dated 11/14/05

REPORTED BY: Chad M Wesley DATE: 12/19/05

INSTRUCTIONS

(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.
(10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
(13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

PROJECT #: 32649.1.1

COUNTY: Craven

DESCRIPTION: Replacement of Bridge No.60 Over Trent River on US 70 Business

	CHANNEL BED MATERIAL			CHANNEL BED MATERIAL			
SAMPLE #	SS-2	SS-4	SS-5	SS-6	SS-9	SS-10	SS-11
RETAINED #4	0	0	0	0	3	0	0
PASSING #10	100	99	100	100	98	100	100
PASSING #40	96	51	97	100	98	100	100
PASSING #200	12	4	37	11	8	50	16
COARSE SAND	14	82	9	8	15	1	12
FINE SAND	78	15	66	85	81	63	80
SILT	3	0	10	2	1	16	3
CLAY	5	3	15	5	3	20	5
LL	24	21	20	24	24	24	22
PL	N.P.	N.P.	N.P.	N.P.	N.P.	17	N.P.
AASHTO CLASSIFICATION	A-2-4(0)	A-3(0)	A-4(0)	A-2-4(0)	A-3(0)	A-4(1)	A-2-4(0)
STATION	19+15	21+10	21+96	22+90	24+77	25+71	26+66
OFFSET	9 LT	8 LT	8 RT	8 LT	24 LT	24 RT	9 LT
DEPTH	0.0	4.8	7.2	14.8	15.1	20.5	18.6

Particle Size Analysis of Soils

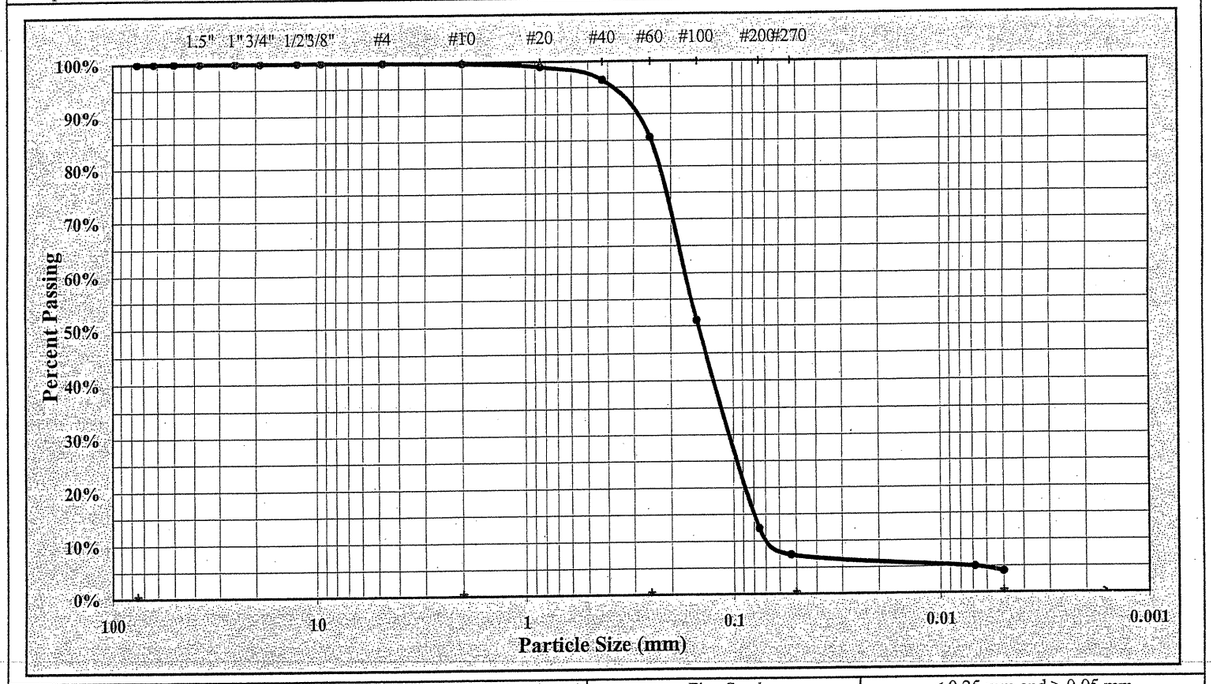
AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

TIP NO: B-2532

Boring #: B1-A	Sample #: SS-2	Sample Date: 11/1/2005
Location: 19+15	Offset: 9 LT	Depth: 0.0 ft.
Sample Description:	Dark Gray Coarse to Fine Sand with Trace of Silt, Clay and Shell Material	A-2-4 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	14.2%	Silt	2.0%
Gravel	0.3%	Fine Sand	78.1%	Clay	5.0%
Apparent Relative Density		Moisture Content		% Passing #200	12.4%
Liquid Limit	24	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	14.2%	Fine Sand	78.4%	Silt	2.4%	Clay	5.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan _____ Laboratory Supervisor
Signature *Signature*

Particle Size Analysis of Soils

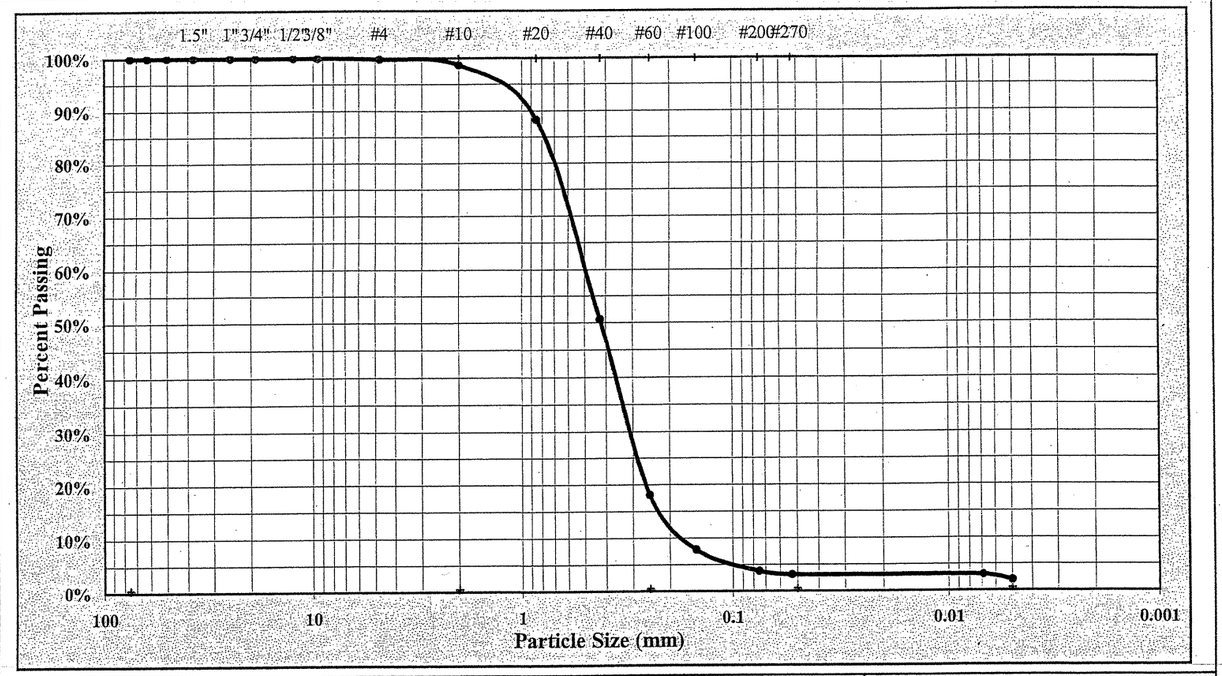
AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business over Trent River**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

TIP NO: B-2532

Boring #: B3-A	Sample #: SS-4	Sample Date: 11/2/2005
Location: 21+10	Offset: 8 LT	Depth: 4.8 ft.
Sample Description:		Gray Fine Sand A-3 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	80.6%	Silt	0.0%
Gravel	1.3%	Fine Sand	15.0%	Clay	3.0%
Apparent Relative Density		Moisture Content	36.6%	% Passing #200	3.8%
Liquid Limit	21	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand	81.7%	Fine Sand	15.2%	Silt	0.1%	Clay	3.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan _____ Laboratory Supervisor
Signature *Signature*

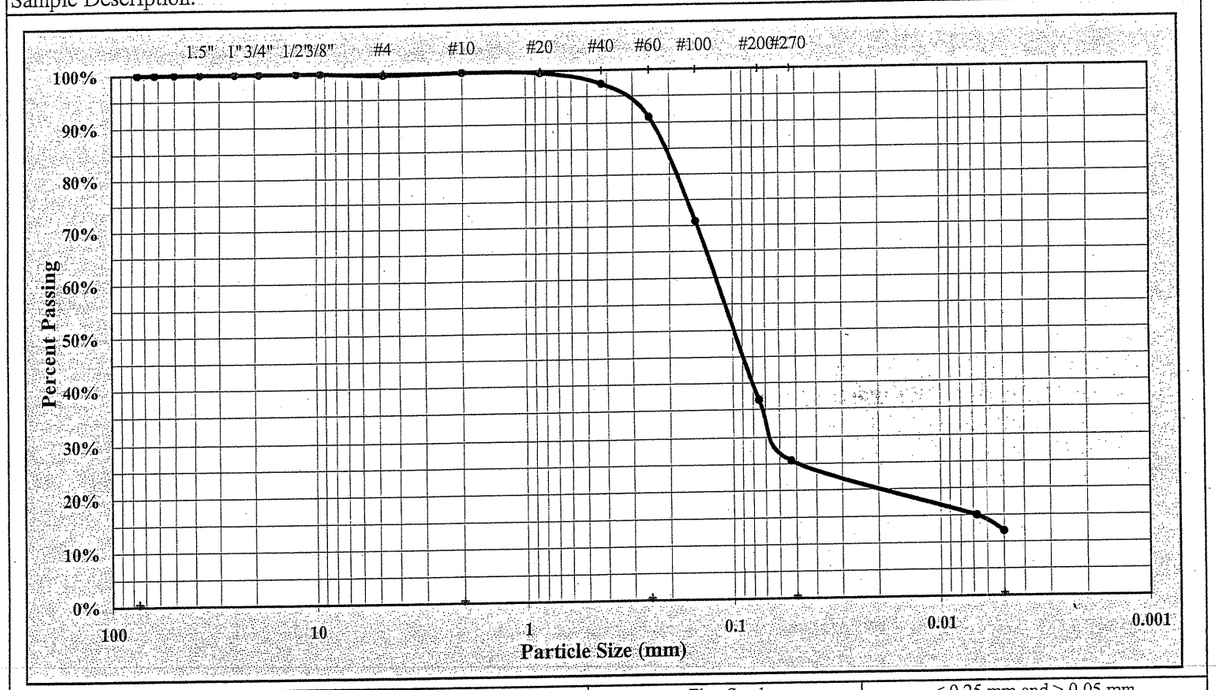
Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business over Trent River**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A TIP NO: B-2532

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

Boring #: B4-B Sample #: SS-5 Sample Date: 10/27/2005
Location: 21+96 Offset: 8 RT Depth: 7.2 ft.
Sample Description: Gray Clayey Fine Sandy Silt A-4 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	8.9%	Silt	11.0%
Gravel	0.1%	Fine Sand	65.4%	Clay	15.0%
Apparent Relative Density		Moisture Content		% Passing #200	36.8%
Liquid Limit	20	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand 8.9% Fine Sand 65.5% Silt 10.6% Clay 15.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan *Signature* Laboratory Supervisor *Signature*

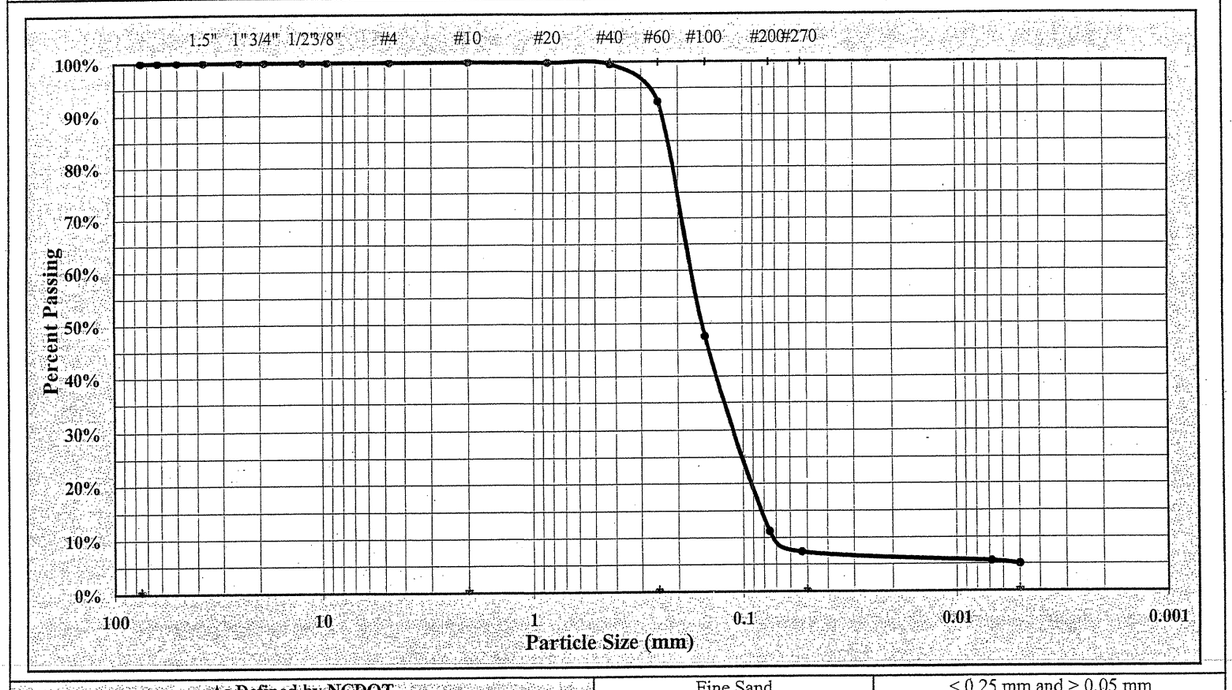
Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business over Trent River**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A TIP NO: B-2532

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

Boring #: B5-A Sample #: SS-6 Sample Date: 11/7/2005
Location: 22+90 Offset: 8 LT Depth: 14.8 ft.
Sample Description: Gray Fine to Coarse Sand with Trace of Silt and Clay A-2-4 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	7.6%	Silt	2.0%
Gravel	0.0%	Fine Sand	85.1%	Clay	6.0%
Apparent Relative Density		Moisture Content		% Passing #200	11.2%
Liquid Limit	24	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand 7.6% Fine Sand 85.1% Silt 1.8% Clay 5.5%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan *Signature* Laboratory Supervisor *Signature*

Laboratory Report Version 4.2

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

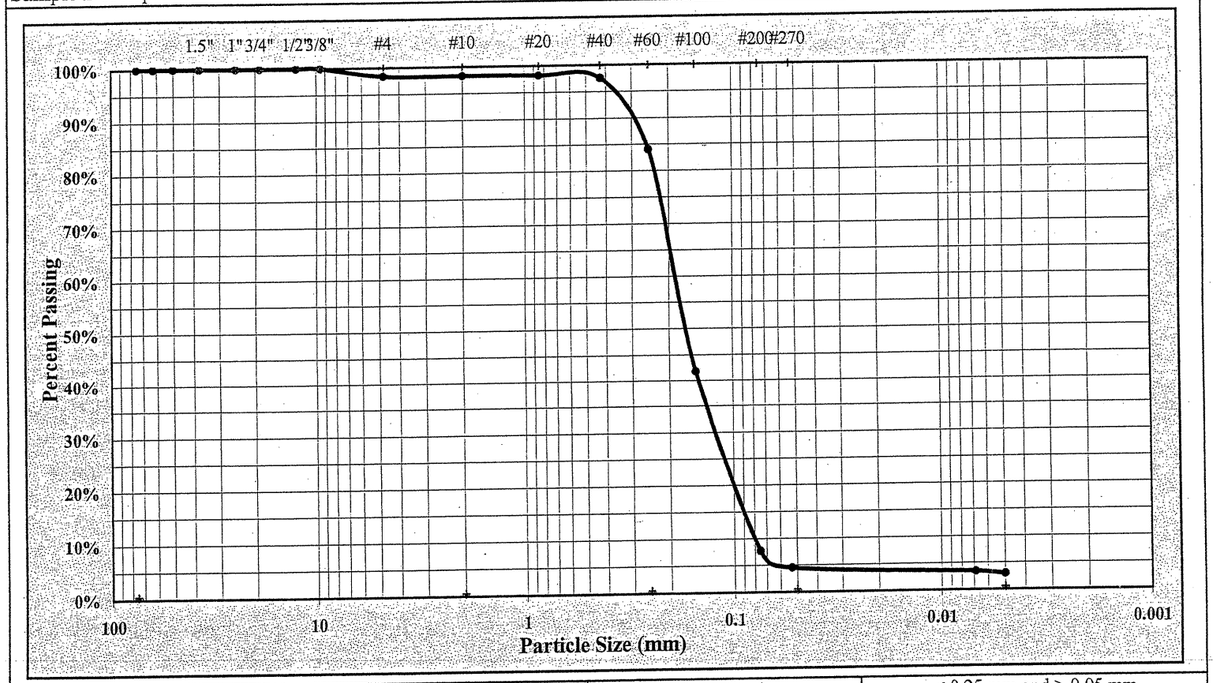
S&ME

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business Over Trent River**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

TIP NO: B-2532

Boring #: B7-A Sample #: SS-9 Sample Date: 11/9/2005
Location: 24+77 Offset: 24 LT Depth: 15.1 ft.
Sample Description: Gray Slightly Silty Coarse to Fine Sand A-3 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	14.3%	Silt	1.0%
Gravel	1.7%	Fine Sand	79.5%	Clay	3.0%
Apparent Relative Density		Moisture Content		% Passing #200	7.7%
Liquid Limit	24	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand 14.5% Fine Sand 80.9% Silt 1.1% Clay 3.5%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan *Signature* Laboratory Supervisor *Signature*

Laboratory Report Version 4.2

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

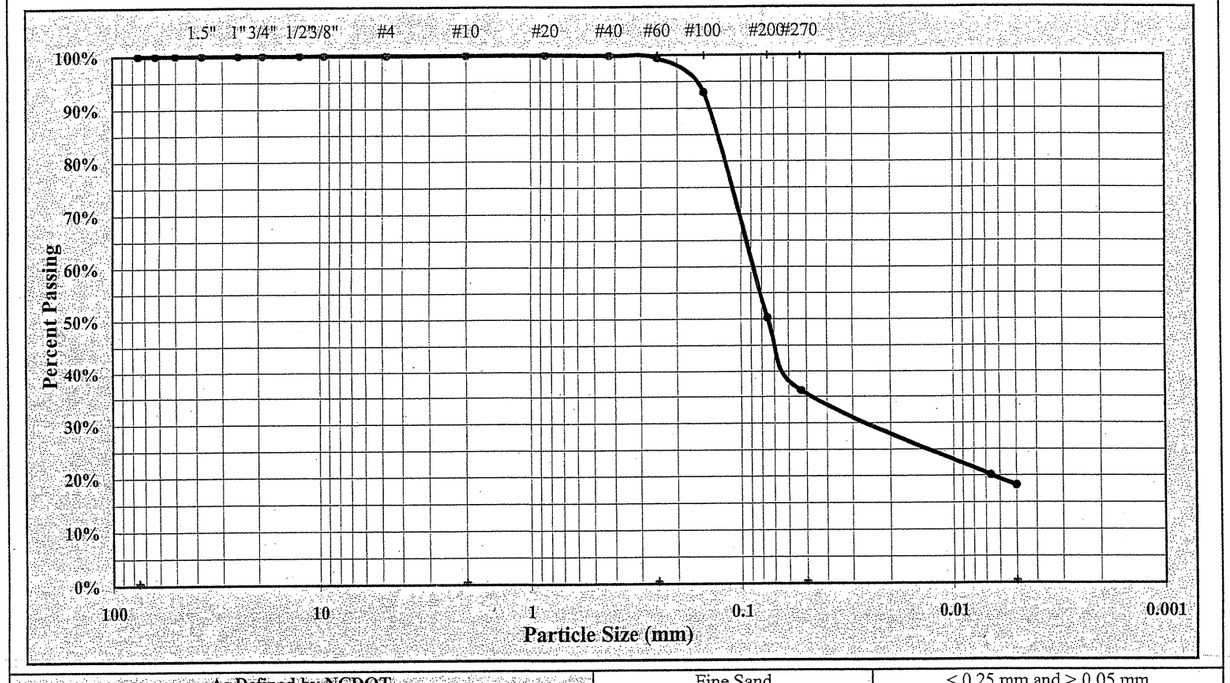
S&ME

S&ME Project #: **1051-05-478**
Project Name: **Bridge 60 on US 70 Business Over Trent River**
Client Name: NCDOT
Client Address:
State Project #: 32649.1.1 F.A. Project No: N/A

Report Date: 11/29/2005
Test Date(s): 11/18 - 11/29/05

TIP NO: B-2532

Boring #: B8-B Sample #: SS-10 Sample Date: 11/8/2005
Location: 25+71 Offset: 24 RT Depth: 20.5 ft.
Sample Description: Gray Clayey Fine Sandy Silt A-4 (1)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	0.6%	Silt	16.0%
Gravel	0.0%	Fine Sand	63.2%	Clay	20.0%
Apparent Relative Density		Moisture Content	26.4%	% Passing #200	50.2%
Liquid Limit	24	Plastic Limit	17	Plastic Index	7

Soil Mortar (-#10 Sieve)

Coarse Sand 0.6% Fine Sand 63.2% Silt 16.1% Clay 20.1%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT
AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T89: Determining the Liquid Limit of Soils
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Karajan *Signature* Laboratory Supervisor *Signature*

S&ME

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-05-478** Report Date: 11/29/2005

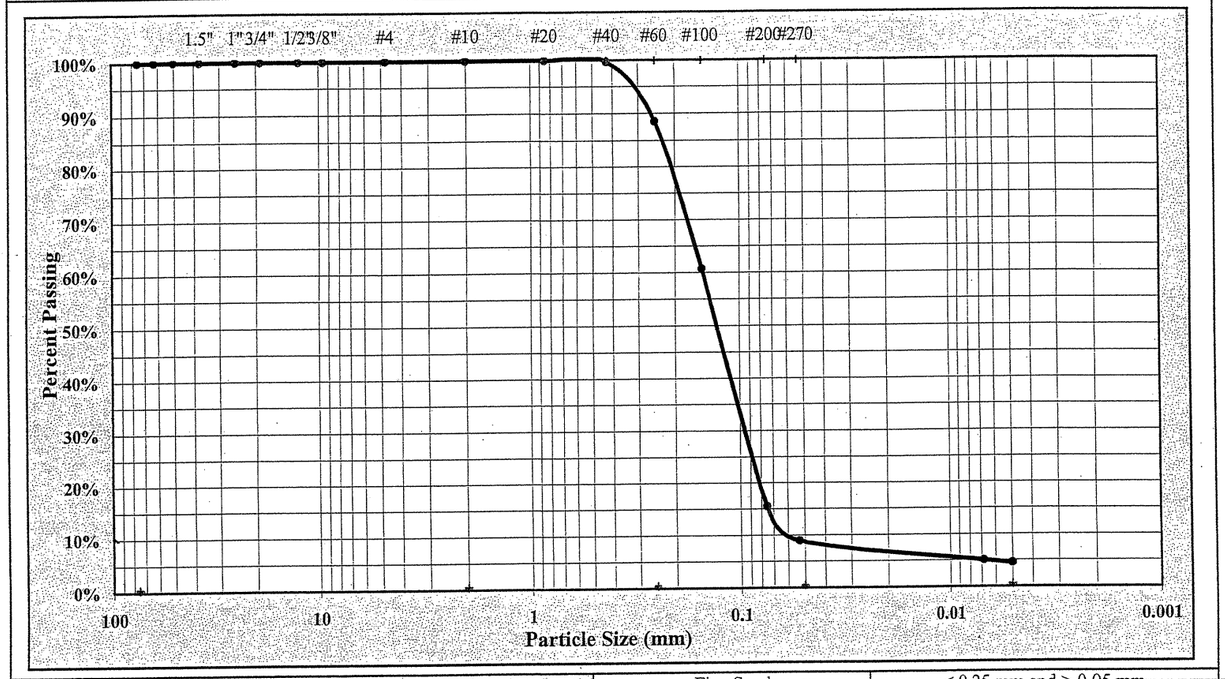
Project Name: **Bridge 60 on US 70 Business Over Trent River** Test Date(s): 11/18 - 11/29/05

Client Name: NCDOT

Client Address:

State Project #: 32649.1.1 F.A. Project No: N/A TIP NO: B-2532

Boring #:	B9-A	Sample #: SS-11	Sample Date: 11/9/2005
Location:	26+66	Offset: 9 LT	Depth: 18.6 ft.
Sample Description:		Gray Coarse to Fine Sand with Trace of Silt and Clay	A-2-4 (0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#20	Coarse Sand	11.5%	Silt	4.0%
Gravel	0.0%	Fine Sand	79.6%	Clay	5.0%
Apparent Relative Density		Moisture Content	19.4%	% Passing #200	15.5%
Liquid Limit	22	Plastic Limit	0	Plastic Index	N.P.

Soil Mortar (-#10 Sieve)

Coarse Sand 11.5% Fine Sand 79.6% Silt 3.9% Clay 5.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

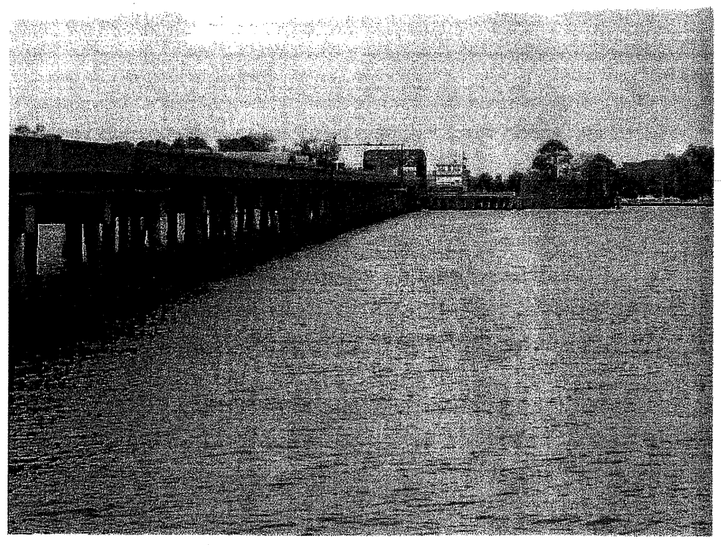
AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

ASTM D 854: Specific Gravity of Soils

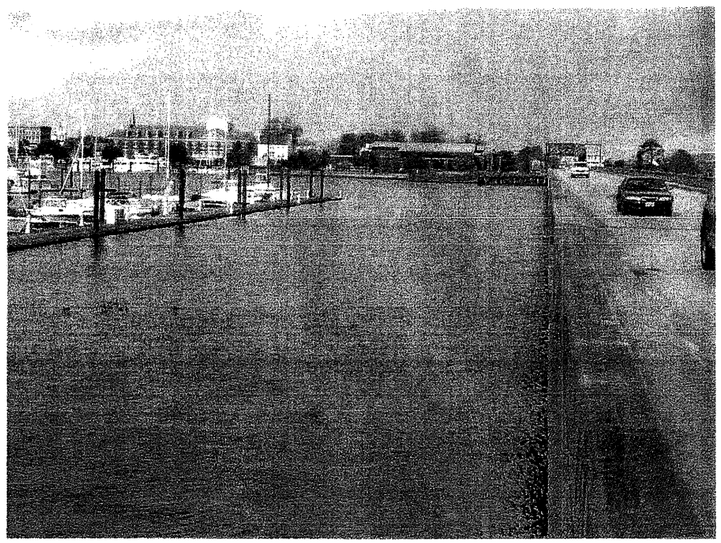
Technical Responsibility: Mal Karajan _____ Laboratory Supervisor

Signature *Signature*

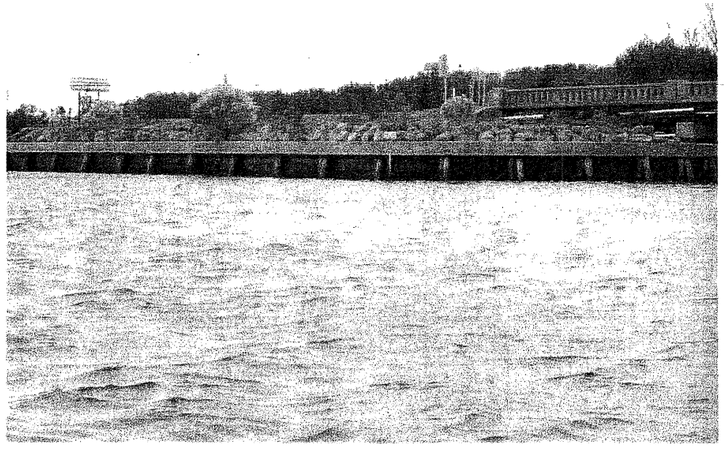
Photograph No. 1:
This photograph was taken from the south approach, along the -L- alignment, looking north.



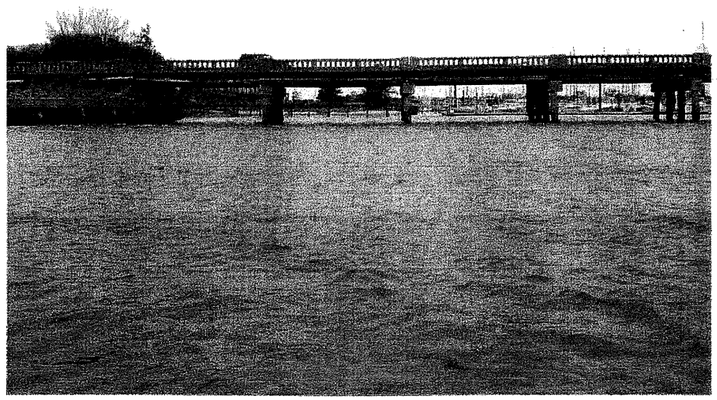
Photograph No. 2:
This photograph was taken from right of the -L- alignment, looking north, along the existing bridge.



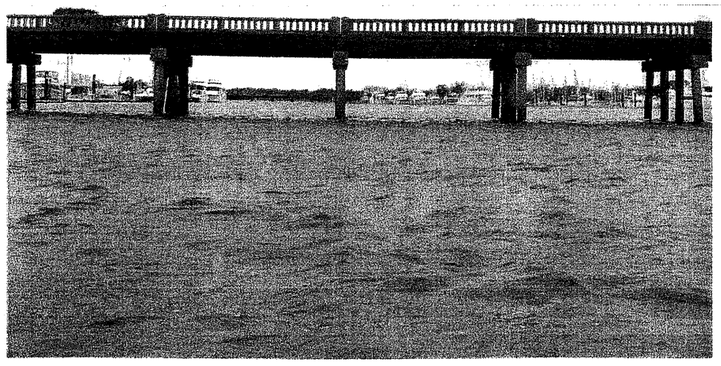
Photograph No. 3:
This photograph was taken from left of the -L- alignment, looking north, along the existing bridge.



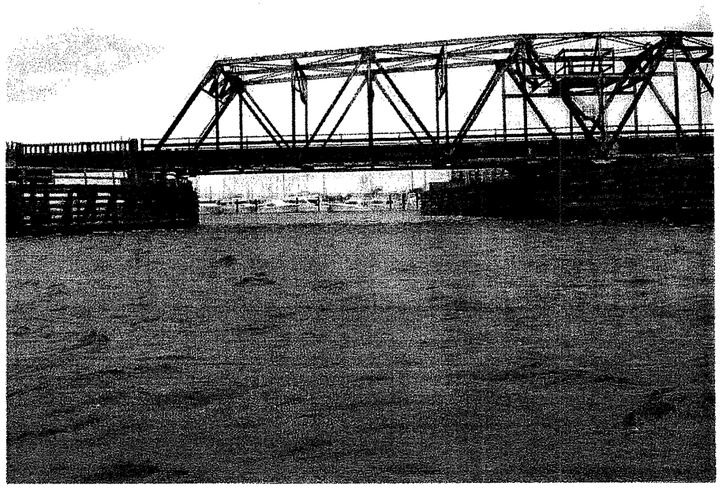
Photograph No. 4:
This photograph was taken from right of the -L- alignment, looking southwest, at a retaining wall east of proposed End Bent No. 1.



Photograph No. 5:
This photograph was taken from right of the -L- alignment, looking west, at proposed End Bent No. 1 and Interior Bent No. 1.

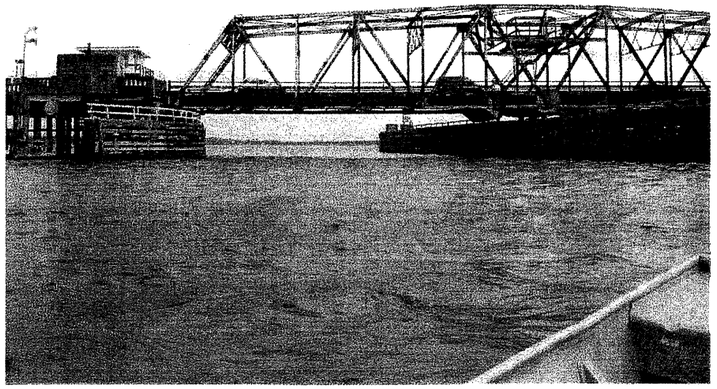


Photograph No. 6:
This photograph was taken from right of the -L- alignment, looking west (upstream), at proposed Interior Bents No. 7 and No. 8.

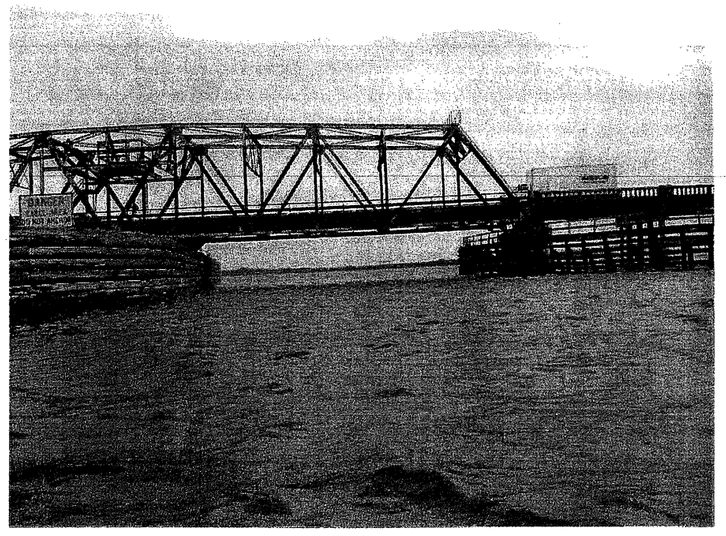


Photograph No. 7:
This photograph was taken from right of the -L- alignment, looking west, at proposed Interior Bent No. 13.

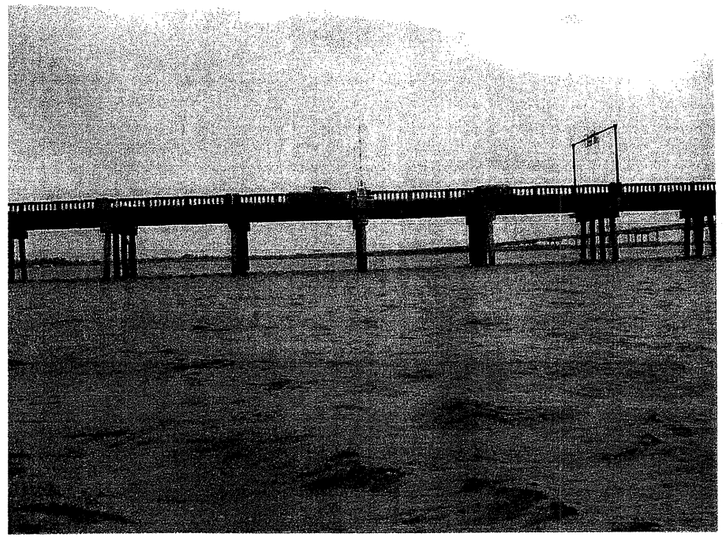
Photograph No. 8:
This photograph was taken from right of the -L- alignment, looking west, at proposed Interior Bents No. 16 and No. 17.



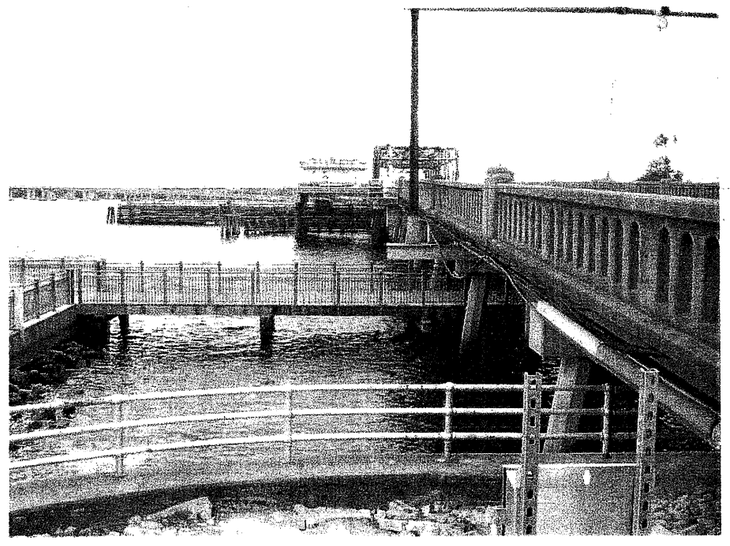
Photograph No. 9:
This photograph was taken from left of the -L- alignment, looking east, at proposed Interior Bent No. 14. BTP-1 is also being drilled just north of the existing fender system.



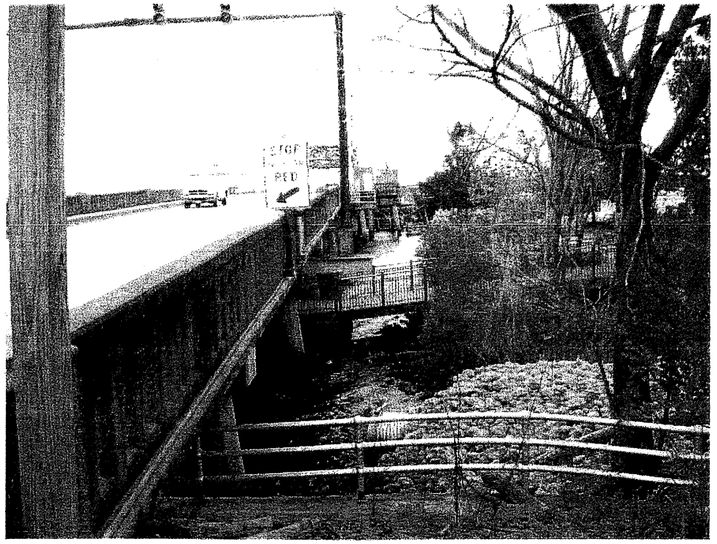
Photograph No. 10:
This photograph was taken from left of the -L- alignment, looking east, at proposed Interior Bent No. 13.



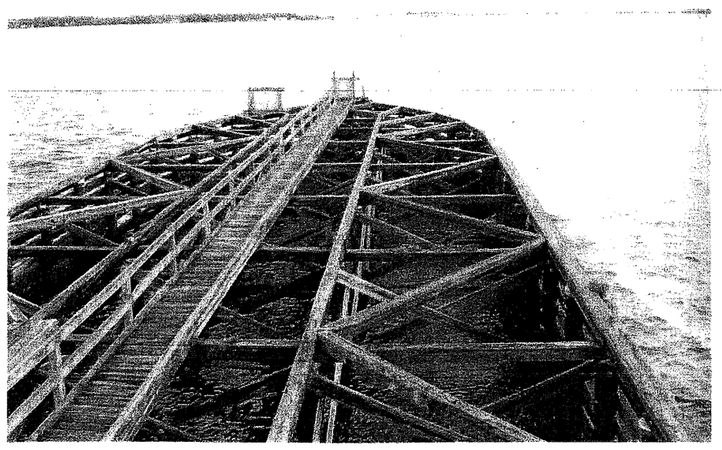
Photograph No. 11:
This photograph was taken from left of the -L- alignment, looking east, at proposed Interior Bents No. 9, No. 10 and No. 11.



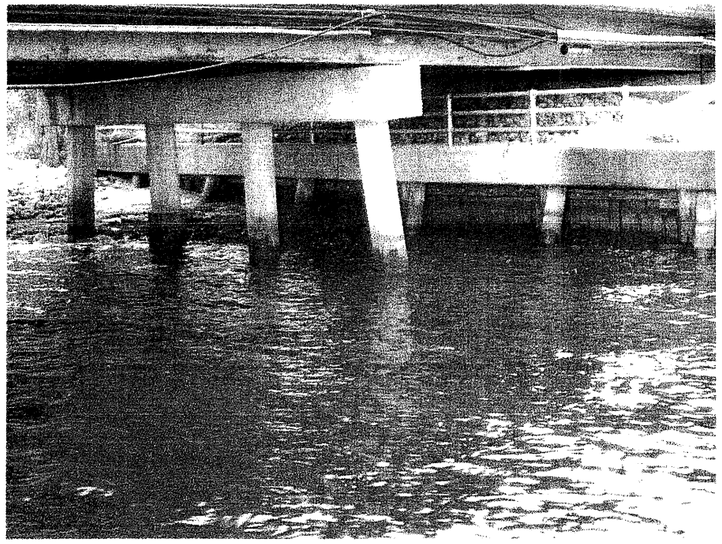
Photograph No. 12:
This photograph was taken from right of the -L- alignment, looking south, along the existing bridge.



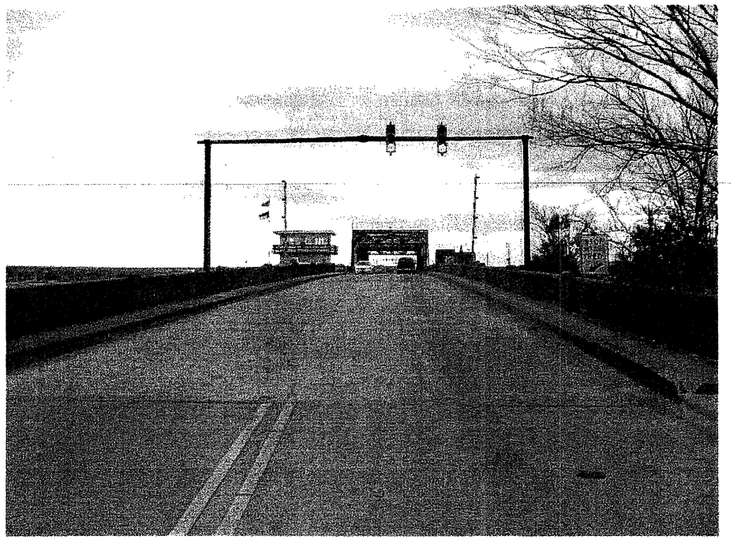
Photograph No. 13:
This photograph was taken from left of the -L- alignment, looking south, along the existing bridge.



Photograph No. 14:
This photograph was taken from the existing bridge, looking east (downstream).



Photograph No. 15:
This photograph was taken from right of the -L- alignment, looking northwest, at existing End Bent No. 2.



Photograph No. 16:
This photograph was taken from the north approach, along the -L- alignment, looking south.