# This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.

This file or an individual page shall not be considered a certified document.

# S À REFERENCE

**CONTENTS** 

**DESCRIPTION** 

TITLE SHEET LEGEND SITE PLAN

PROFILE(S)

BORE LOG(S) SOIL TEST RESULTS

CROSS SECTION(S)

CORE PHOTOGRAPH(S)

SITE PHOTOGRAPH(S)

SHEET NO.

5-6

7-10

12

13-14

# 38.

# STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>G</u>	ASTON					
PROJECT [	)ESCRIP1	TION BRI	DGE NO	). 203 ON	SR	1935
(WILLOW						
SITE DESCI	RIPTION .					

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4751	1	14

### **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 1999 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

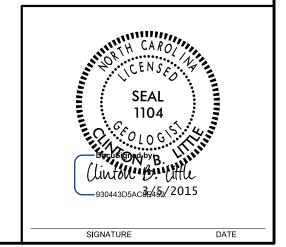
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS WATCH THE CONDIT 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 DES 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS.

- TES:
  THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
  OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
  OR CONTRACT FOR THE PROJECT.
  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.

M.R. MOORE J.E. ESTEP R.S. HINSON C.L. SMITH R.W. TODD C.E. BURRIS J.A. NEWBERRY INVESTIGATED BY J.E. BEVERLY DRAWN BY \_\_J.K. McCLURE CHECKED BY \_\_\_\_C.B. LITTLE SUBMITTED BY <u>C.B.</u> LITTLE DATE FEBRUARY 2015

**PERSONNEL** C.C. MURRAY



PROJECT REFERENCE NO. SHEET NO.

B-4751

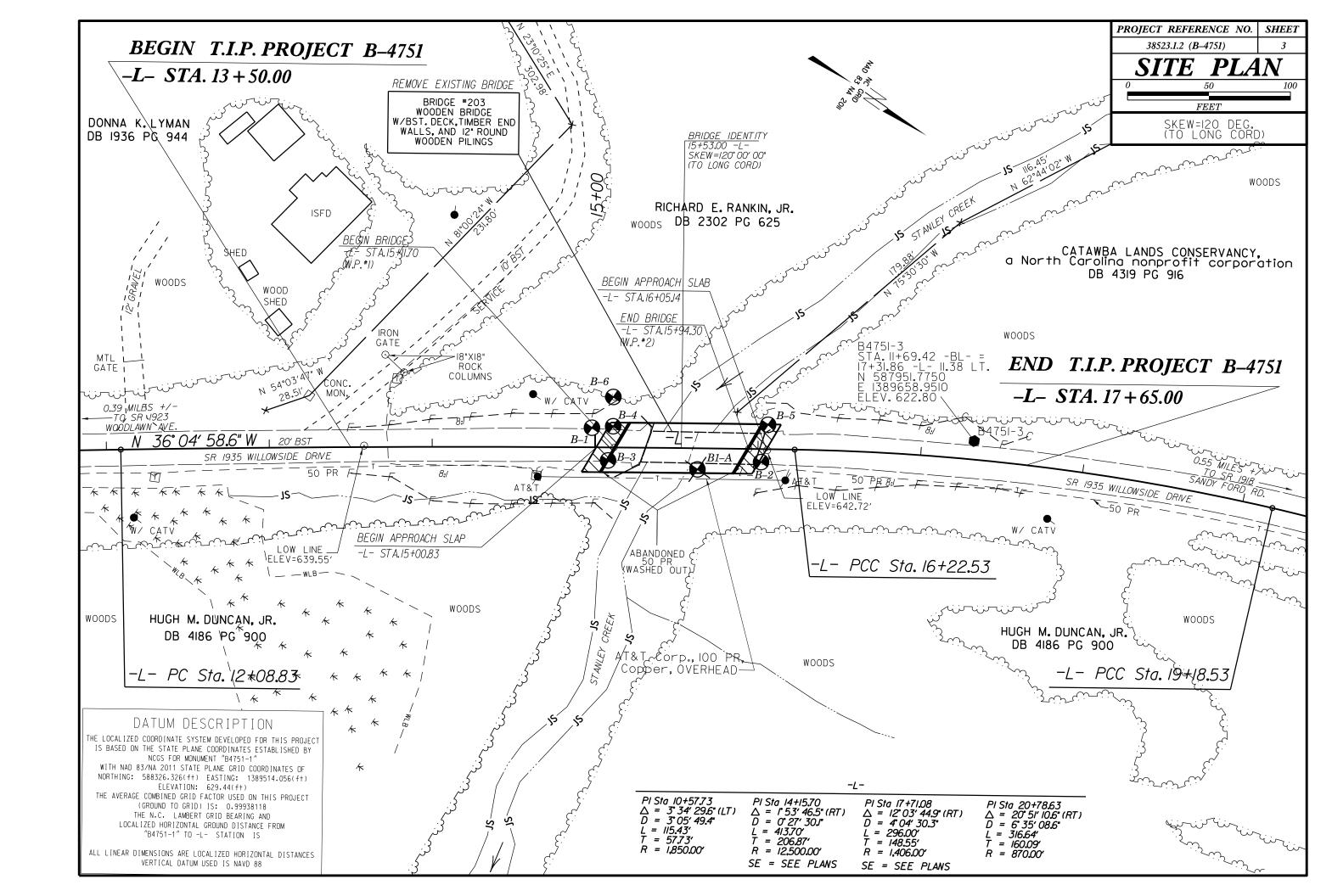
2

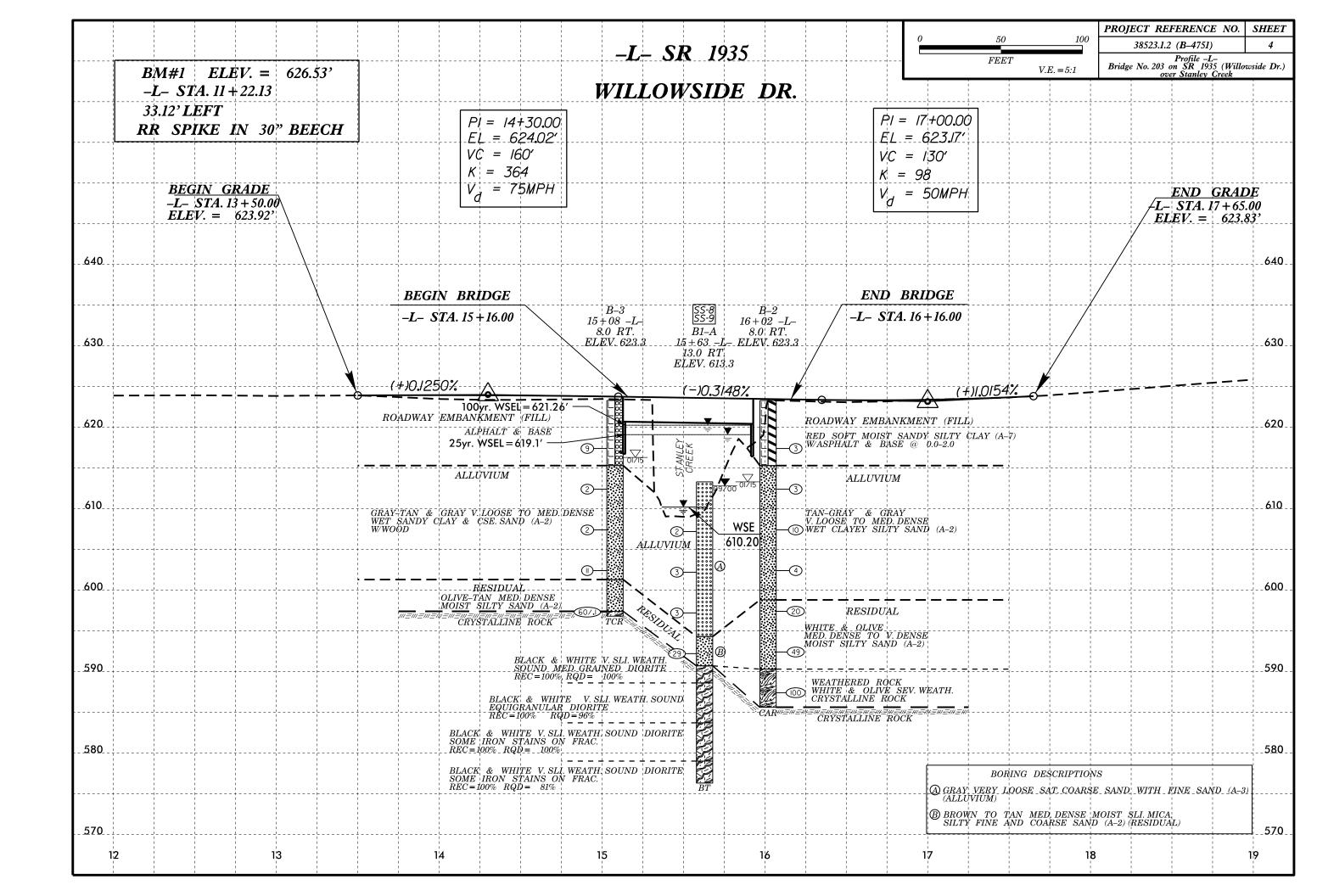
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

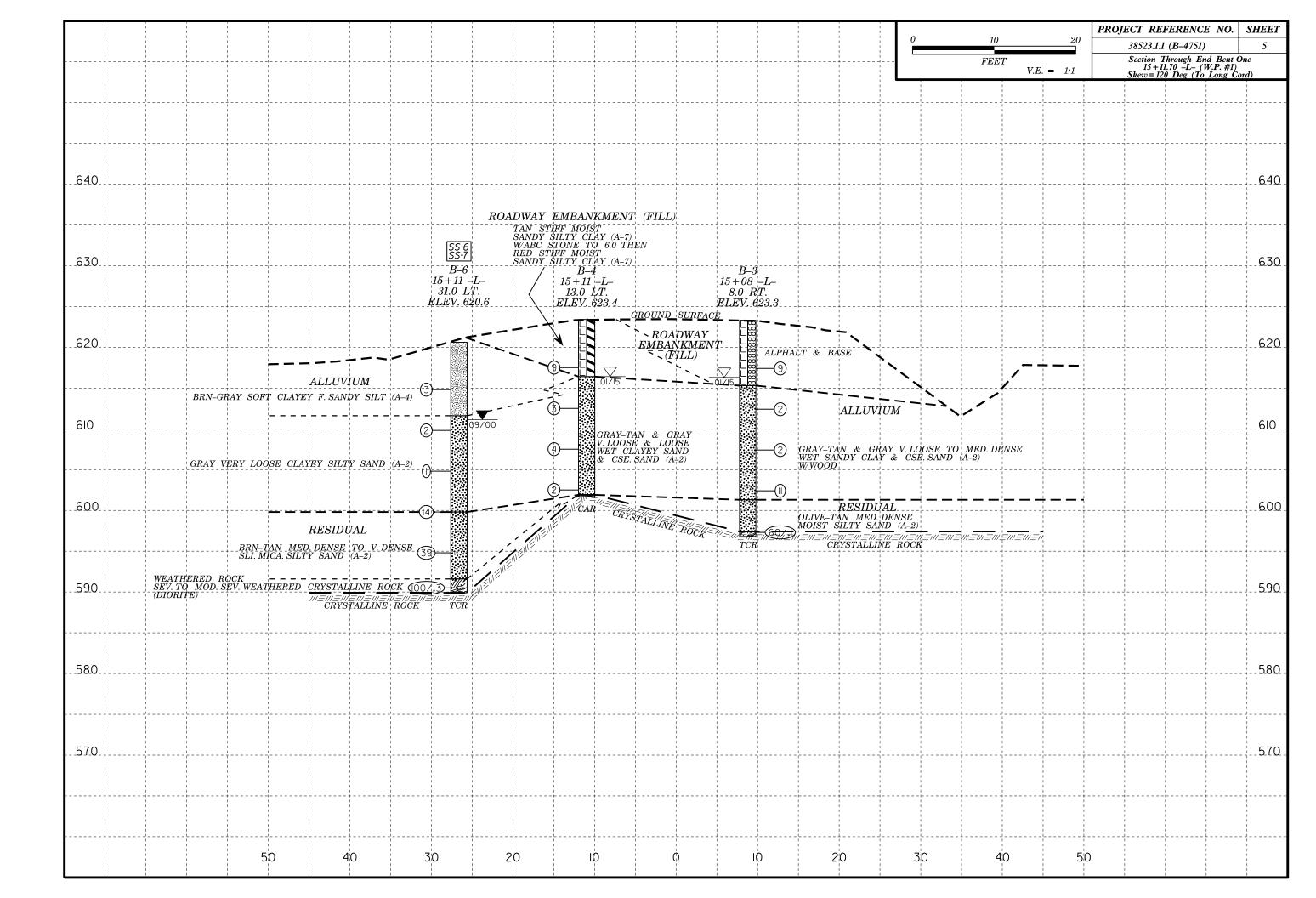
# SUBSURFACE INVESTIGATION

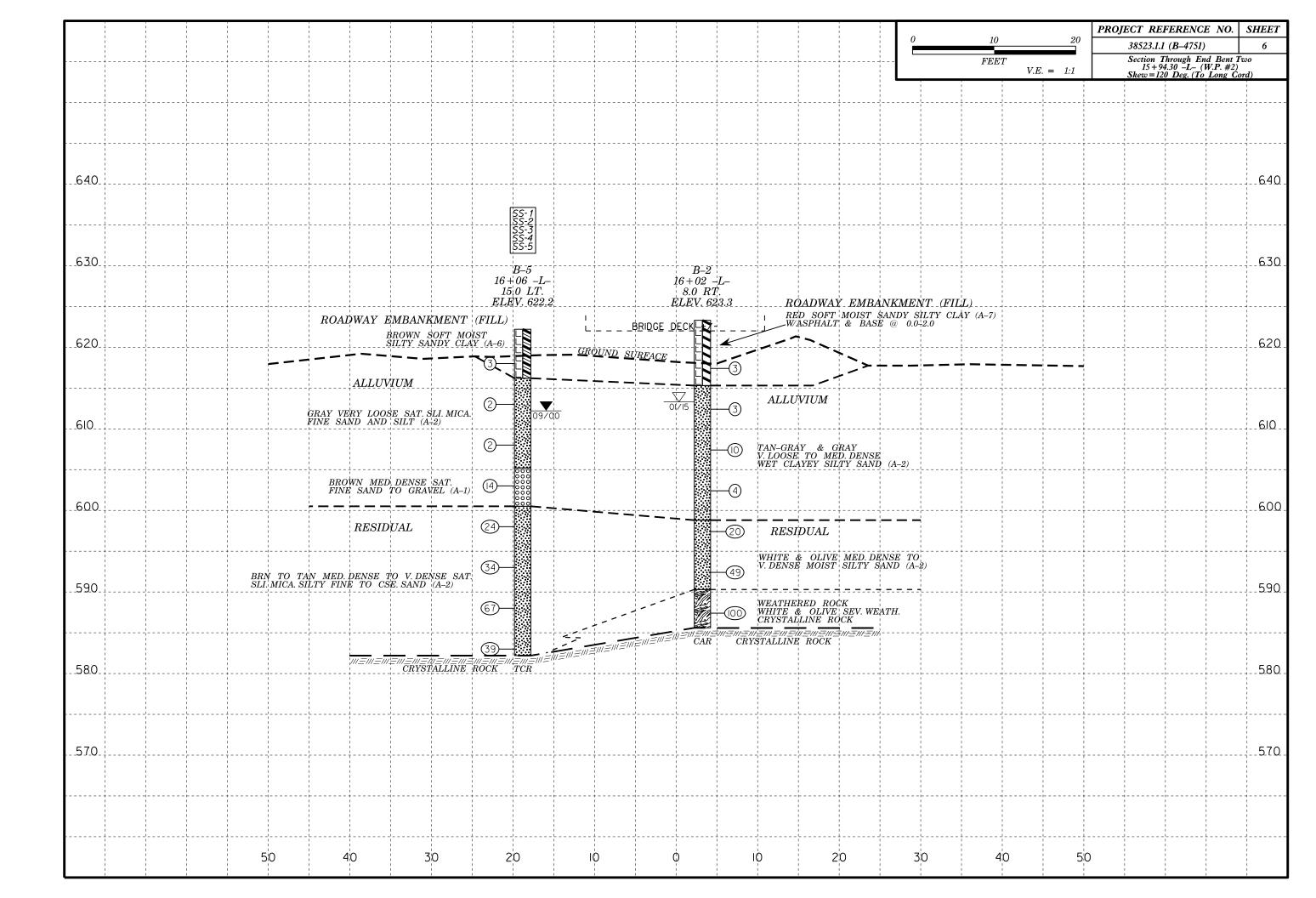
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

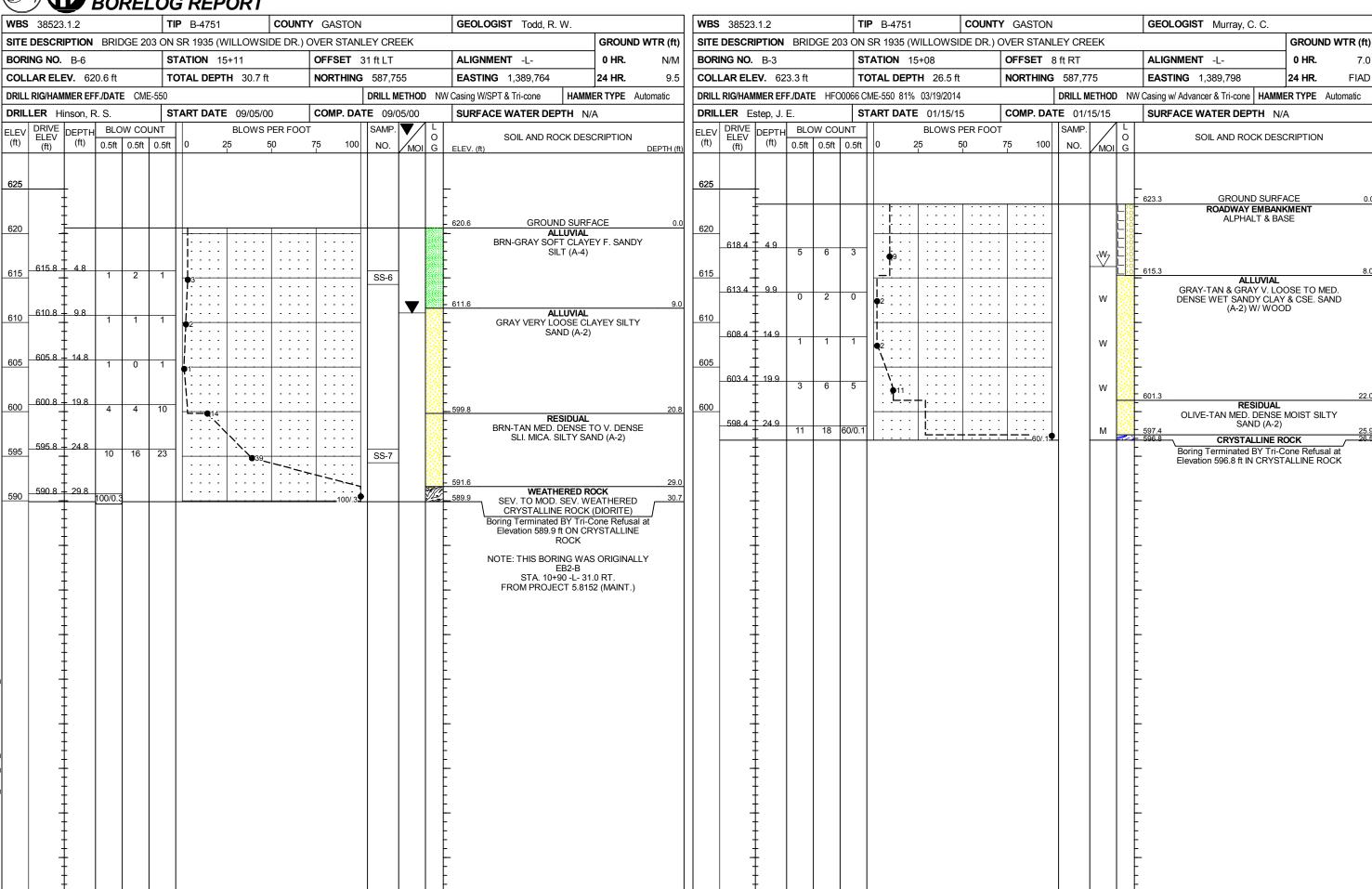
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	ADUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED VISUAL NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) CRGANIC MATERIALS  ORGANIC MATERIALS  ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)  WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GMEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY	NON CONSTALLING FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
Z PASSING GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
■40 30 MX 50 MX 51 MN SOILS COLS PEAT	GRANULAR SILT - CLAY	- WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
-200 15 MX 25 MX 13 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.  VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 11TIE 00	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE ORGANIC	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO  (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS  OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS  OF MAJOR GRAVEL AND SAND SOILS	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	∇PW     PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
P1 0F A-7-5 SUBGROUP IS ≤ LL - 30 ;P1 0F A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  ROADWAY EMBANKMENT (RE)  DIP & DIP DIRECTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL  SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
VERY LODGE 6.4	SPT STATE OF THE S	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GENERALLY LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	VST PMT INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
(MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE 2 2 DB		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	— INFERRED SOIL BOUNDARY ← CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A ALLINYAL COLL POLINDARY A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	INSTALLATION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
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	UNDERCUT UNCLASSIFIED EXCAVATION - EXCAVATION UNSUITABLE WASTE  UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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
COARSE FINE	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE, SU.) (F SU.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOU MOISTURE SCALE FIFLD MOISTURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOL ID. REQUIRES DRVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS,) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RAINUE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: BL-3 (B475I-3)
"" PL L _ PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	STA. II+69.42 -BL- = 17+31.86 -L- II.38 LT.
OMOPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	N 587951.7750 E 1389658.9510 ELEVATION: 622.80 FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS FLIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	SOIL STRATIGRAPHY IS THROUGH THE BORINGS FOR PROFILE AND CROSS-SECTIONS.
	CME-55     8*HOLLOW AUGERS   CORE SIZE:   -BH	THINLY LAMINATED < 0.008 FEET  INDURATION	MIND CHOSS-SECTIONS.
PLASTICITY	<b>1</b>	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC 0-5 VERY LOW	X CME-550 HARD FACED FINGER BITS  TUNG,-CARBIDE INSERTS  X-N XWL	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST X CASING X W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICOUS 2 15/ TRUE CARD	BREAKS EASILY WHEN HIT WITH HAMMEN.  GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
	X TRICONE 2 15/6 TUNGCARB. SOUNDING ROD	INDURATED DIFFICULT TO BEFARE WITH STEEL PROBE;	
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.	X CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOSE IEIG GUCH AG EIGHT, DANK, GTHEAKEU, ETC. HAE UGED TO DEGUNDE HEFEHAHNCE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14





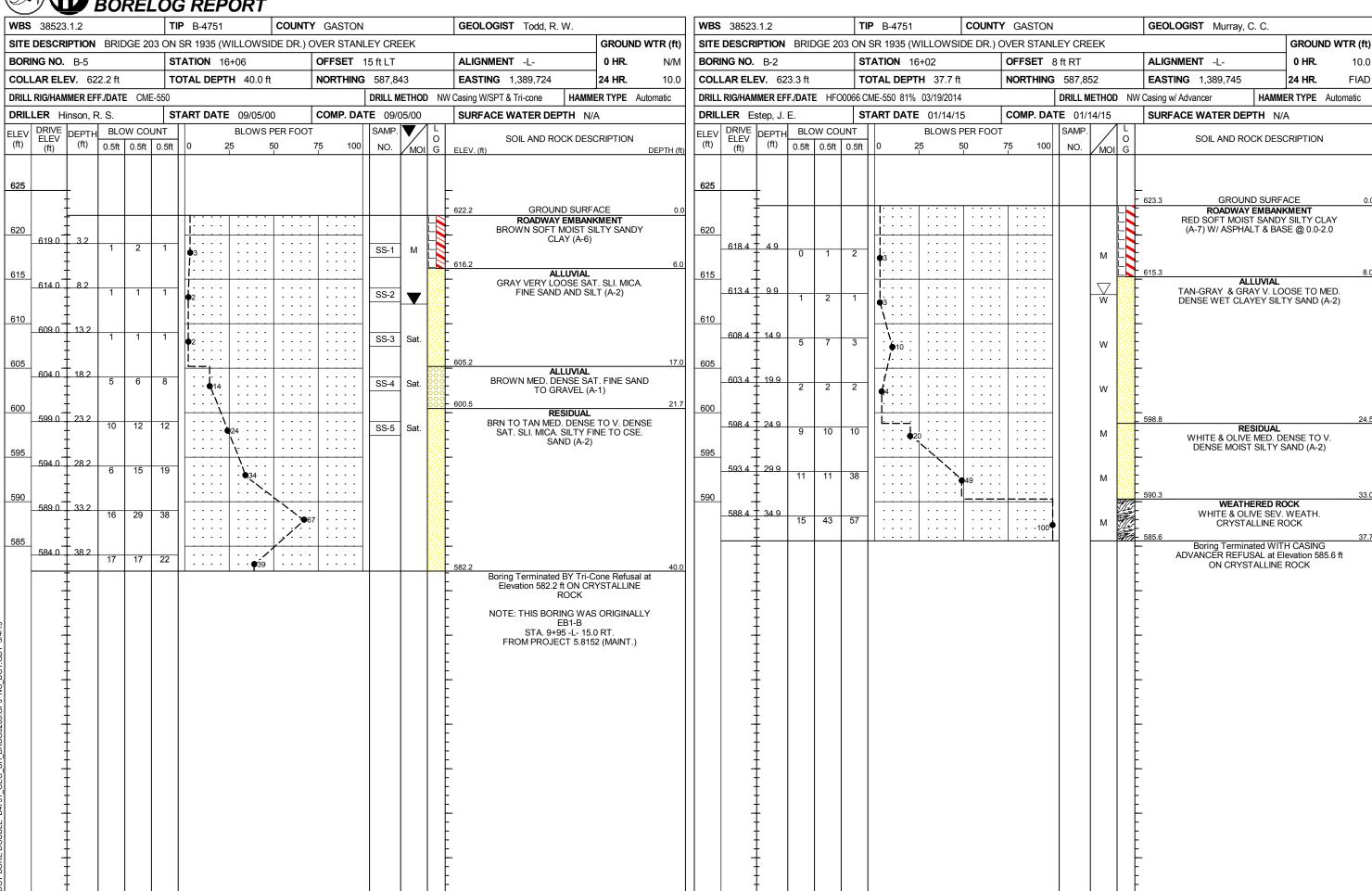






WBS 38523.1.2 TIP B-4751 COUNTY GASTON							GEOLOGIST Mu	WBS 38523.1.2 TIP B-4751 COUNT							GASTON	C. C.														
			DGE 203 (	ON SR 19	35 (WILL		DR.) OVER S		Y CRE	EK		1		GROUND W	/TR (ft)	SITE DESCRIPTION BRIDGE 203 ON SR 1935 (WILLOWSIDE DR.) (										JND WTR (ft)				
	ING NO. B				N 14+98		OFFSE					ALIGNMENT -L-		0 HR.	N/M	BORING NO. B-4 STATION 15+11						OFFSET			ALIGI	NMENT -L-	0 HR			
COLI	LAR ELEV.	623.3 ft		TOTAL	DEPTH 1	7.2 ft		IING 5		55		<b>EASTING</b> 1,389,7	787	24 HR. CV	/ @ 3.0	COLI	COLLAR ELEV. 623.4 ft			TOTAL DEPTH 21.7 ft			NORTHING	<b>3</b> 587,76	 35	<b>EASTING</b> 1,389,779		24 HR		
DRILL	. RIG/HAMME	R EFF./DA	E HFO006	6 CME-550	81% 03/1	19/2014	<u> </u>	DF	RILL MI	ETHOD	NW	Casing w/ Advancer	HAM	/MER TYPE Auto		DRILL	_ RIG/HAN	MER EF	F./DATE	HF00	O0066 CME-550 81% 03/19/2014				DRILL M	RILL METHOD NW Casing w/ Advancer HAM			HAMMER TYPI	E Automatic
	LER Estep				DATE 0		COMP	DATE				SURFACE WATER				DRILLER Estep, J. E.					START DATE 01/16/15			COMP. DA		01/16/15 SURFACE WATER DEPT				
	DRIVE DE		OW COUNT	-	BL	OWS PER	FOOT	S	SAMP.	<b>V</b> /	L	l					DRIVE ELEV			v cou	JNT	BLOW	/S PER FOOT		SAMP.		-   '			
(ft)			0.5ft 0.	oft 0	25	50	75	100	NO.	MOI	0 G	SOIL AN	ID ROCK DE	ESCRIPTION [	DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	MOI G		SOIL AND RC	OCK DESCRIPTION	ON
625																625														
	<u> </u>										-		ROUND SUF		0.0			<u> </u>						T			- 623.4		ID SURFACE	0.
											300	<b>ROAI</b> ASPHALT	<b>DWAY EMBA</b> & BASE (AB	BC STONE) W/				Ŧ						: : : :			1	TAN STIFF MOIS		
620	1				<u> </u>						30		BOULDEF	RS		620	1 -	Ŧ				1					-	(A-7) W/ ABC STO STIFF MOIST SAI	ONE TO 6.0 THE NDY SILTY CLAY	N RED ( (A-7)
	618.3 7 5	.0 6	8 60/	0.1	j   .	.				M L							618.5	4.9	6	7	2						-			,
	<del>- +</del>			11	·			50/.1 <del>•</del>		L	00	616.1	orminated W	/ITH CASING	7.2	615		‡				<del>;`</del> T°:: :::				-M	616.4	AL	LUVIAL	7.
	‡										F	ADVANCER I	REFUSAL at	t Elevation 616.1 f	t	015	613.5	+ 99				<u> </u>			1		<b>-</b>	GRAY-TAN & GRAWET CLAYEY SA	AY V. LOOSE & L	.OOSE
											F	IN ROA	DWAY EME BOULDEI)	BANKMENT R)			010.0	1	2	1	2	<b>3</b> · · · · · · · ·				W	<b>S</b>	WEIGLAILIGA	IND & COL. OAN	J (A-2)
	1 ±										Ł	. NOTE	: HOLE ABA	ANDONED		610	_	Ł				j					Ł			
	l Ŧ										F						608.5	14.9	0								XF			
											F							Ŧ	0	2	2	<del>  •</del> • • • • • • • • • • • • • • • • • •				W	<b>X</b> F			
	‡										F					605		‡				1			41		<u> </u>			
	‡										ļ						603.5	19.9	1	1	1	<u>                                     </u>				w	<b>*</b>			
	‡										þ							<u> </u>				2		<u> </u>	+		601.9 601.7	\ 0.11.017	ALLINE ROCK	21. /\_21.
												•					-	‡									-	Boring Termin ADVANCER REFU	ated WITH CASI SAL at Elevation	NG 601.7 ft
	1										Ł							ŧ									E	IN CRYST	ALLINE ROCK	
											ŀ							ł									-			
	l Ŧ										F							Ŧ									F			
											F							Ŧ									F			
	‡										F	•					_	‡									Ė			
	‡										ţ							‡									ţ			
	1 1										E							ŧ									E			
	+										$\vdash$	•					-	+									-			
	Ŧ										F							Ŧ									F			
	‡										F							Ī									F			
	‡										F	•					-	‡									F			
	‡										ļ							‡									ļ.			
	‡										Ł						_	ţ									Ł			
	1 1										E							ł									E			
5											+							ł									-			
	‡										F						_	Ŧ									F			
	‡										ļ							‡									ļ.			
	‡										ţ							‡									ļ.			
												•					-	‡									-			
	1										Ł							ŧ									E			
	<del> </del>										F							+									-			
3	‡										F	•					-	Ŧ									F			
	‡										ļ.							‡									ļ.			
	‡										Ł						_	‡									L			
											F							t									Ł			
											F							<del>ľ</del>									F			
[	‡										F						_	Ŧ									F			
3	‡										ļ.							‡									ţ			
3	l İ										H							†		1							F			

VBS	38523	3.1.2			TI	P	B-4751		COUNT	<b>Y</b> GASTON				GEOLOGIST Todd, R. W.	
ITE	DESCR	IPTION	BR	DGE 2	203 ON	SR	1935 (W	ILLOWSI	DE DR.) (	OVER STANL	EY CRE	EK			GROUND WTR (1
ORII	NG NO.	B1-A			S	TAT	<b>TION</b> 15	+63		OFFSET 1	13 ft RT			ALIGNMENT -L-	<b>0 HR.</b> N/
OLL	AR ELI	<b>EV</b> . 6	13.3 ft		T	ОТА	AL DEPTI	<b>d</b> 37.0 ft		NORTHING	587,82	23		<b>EASTING</b> 1,389,771	<b>24 HR.</b> 0
RILL	RIG/HAN	MER E	F./DA	TE CM	IE-550						DRILL N	ETHOD	) NW	/ Casing W/SPT & Core HAM	MER TYPE Automatic
RILI	ER H	inson, I	R. S.		S	TAR	RT DATE	09/05/00	0	COMP. DAT	<b>FE</b> 09/0	05/00		SURFACE WATER DEPTH	N/A
_EV	DRIVE ELEV	DEPTH	BL	ow co	DUNT			BLOWS F	PER FOOT		SAMP.	lacksquare	LO	SOIL AND ROCK DE	SCRIPTION
ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5 5	50	75 100	NO.	MOI		ELEV. (ft)	DEPTH
15		1												_	
		<u> </u>				Н.				1		V	-	613.3 GROUND SUR	
	-	<u> </u>				i :							0000	GRAY VERY LOOSE S	SAT. COARSE
10	-	5 1											0000	SAND WITH FINE S	SAND (A-3)
	608.2	5.1	1	1	1	·	2				SS-8	Sat.	0000		
05	-	ţ				<u>                                     </u>							0000	=	
	603.2	10.1											0000		
	-	ł	1	2	1	•	3						0000		
00	_	Ŧ				╟				1			0000	<u>-</u>	
	598.2	15.1	1	2	1								_		
95	-	Ŧ				ĭ			: : : :				0000		
	593.2	20.1				†							-	T594.3 RESIDUA	1
		+	7	12	17			<b>2</b> 9			SS-9	М	_	BROWN TO TAN MEDIUI SLIGHTLY MICA. SIL	TV EINE AND
90	-	‡							+===					COARSE SANI	) (A-2)
		‡												(RUN 1) BLACK & WHITE	: V. SLI. WEATH.
85	-	‡												SOUND MED. GRAIN REC=100%, RQI	
03	-	‡												CRYSTALLINE 583.7 (RUN 2) BLACK & W	
		‡												WEATH, SOUND EQUIDIORITE REC=100%	JIGRANULAR
80	-	‡												CRYSTALLINE	ROCK
		‡												579.0 (RUN 3) BLACK & WHITE SOUND DIORITE, SOM	E IRON STAINS
	-													ON FRAC. REC=100% CRYSTALLINE	
	-	ł											<u> </u>	- (RUN 4) BLACK & WHITE SOUND DIORITE, SOM	V. SLI. WEATH.
		ł											l E	ON FRAC. REC=1009	6 RQD= 81%
	_	ł											l	Boring Terminated at Ele CRYSTALLINE ROC	
		1											-	NOTE: THIS BORING W	AS ORIGINALLY
	-	Ŧ											l F	B1-A STA. 10+38 -L-	13.0 LT.
	-	Ŧ											lF	FROM PROJECT 5.8	
		Ŧ											F		
	-	‡													
	-	‡												<del>-</del>	
		‡													
	-	‡											l ⊧	<del>-</del>	
		‡											╽		
	-	‡											╽		
	-	‡												_	
		t											E		
	-	£											F	_	
	-	Ŧ											F	<del>-</del> ·	
	-	Ŧ												•	
	-	‡												<del>-</del>	
		‡													
	-	t											l H		



# TEST RESULTS

PROJECT: 38523.1.2 (B-4751)

COUNTY: GASTON

SITE DESCRIPTION: BRIDGE 203 ON SR 1935 (WILLOWSIDE DR.) OVER STANLEY CREEK

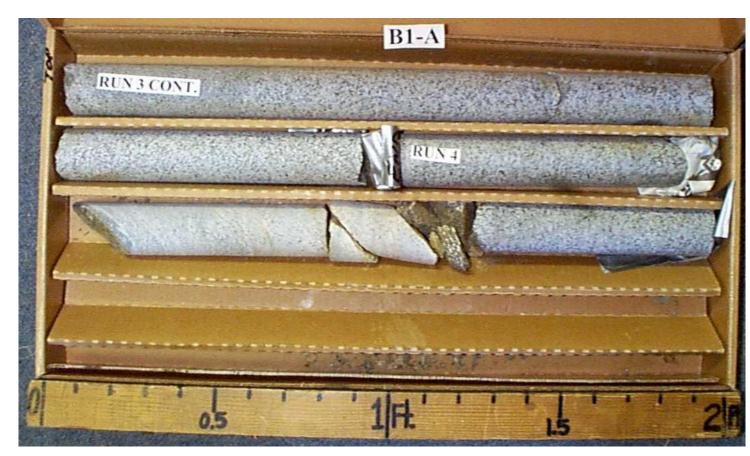
SHEET	
11	

SOIL S	SAMPLE RES	ULTS																	ROCE	SAMPLE RE	SULTS					
SAMPLE NO.	OFFSET	STATION	DEPTH	AASHTO	N	L.L.	P.I.		% BY WEIG	GHT		% PAS	SSING S	IEVES	%	%	UNIT	VOID	SAMPLE NO.	OFFSET	STATION	DEPTH	RQD	UNIT WT	Q(ksf)	E(MPsi)
			INTERVAL	CLASS				C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC	WT. (d)	RATIO				INTERVAL		(pcf)		
		B-5																								
SS-1	15.0' LT.	16+06 -L-	3.20-4.70	A-6(3)	3	35	15	29.7	26.2	17.9	26.2	90	72	43												
SS-2	15.0' LT.	16+06 -L-	8.20-9.70	A-2-4(0)	2	22	NP	31.9	37.9	18.1	12.1	100	79	35												
SS-3	15.0' LT.	16+06 -L-	13.20-14.70	A-2-4(0)	2	23	NP	18.4	53.1	20.5	8.1	100	93	35												
SS-4	15.0' LT.	16+06 -L-	18.20-19.70	A-1-b(0)	14	22	NP	66.7	22.9	7.4	3	67	33	7												
SS-5	15.0' LT.	16+06 -L-	23.20-24.70	A-2-4(0)	24	27	NP	49.4	32.5	16	2	89	57	20												
		B1-A																								
SS-8	13.0' RT.	15+63 -L-	5.10-6.60	A-3(0)	2	22	NP	66.9	28.8	3.3	1	96	63	6												
SS-9	13.0' RT.	15+63 -L-	20.10-21.60	A-2-4(0)	29	25	NP	43.4	37.3	17.3	2	98	70	24												
		B-6																								
SS-6	31.0' LT.	15+11 -L-	4.80-6.30	A-4(4)	3	32	10	17	26.8	34	22.2	99	89	62												
SS-7	31.0' LT.	15+11 -L-	24.80-26.30	A-2-4(0)	39	28	NP	45.6	35.7	16.6	2	87	59	21												

# 38523.1.2 (B-4751) GASTON COUNTY BRIDGE 203 ON SR 1935 (WILLOWSIDE DR.) OVER STANLEY CREEK

# CORE PHOTOS





# 38523.1.2 (B-4751) GASTON COUNTY BRIDGE 203 ON SR 1935 (WILLOWSIDE DR.) OVER STANLEY CREEK

# SITE PHOTOS



