CONTENTS

SHEET NO. 2 3 4

5-6

5000

REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN PROFILE BORE LOGS SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GASTON

PROJECT DESCRIPTION _______ J-85 /US 321 INTERCHANGE **GEOMETRIC SAFETY IMPROVEMENTS**

SITE DESCRIPTION CULVERT AT STA. 18+50 -RPD-

m ら 411. PROJEC

STATE N.C.

41153.1.1

TOTAL SHEETS 7

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 SOLI TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6800. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL 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 STIU (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 SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOL 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 PLANSARE 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 OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERNALS AND CONSTRONG TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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CHECKED BY D. DEWEY, PE
Summit Design and Engineering
SUBMITTED BY Services, PLLC
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— CA8721209FCB476 10/3/2016
SIGNATURE DATE
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

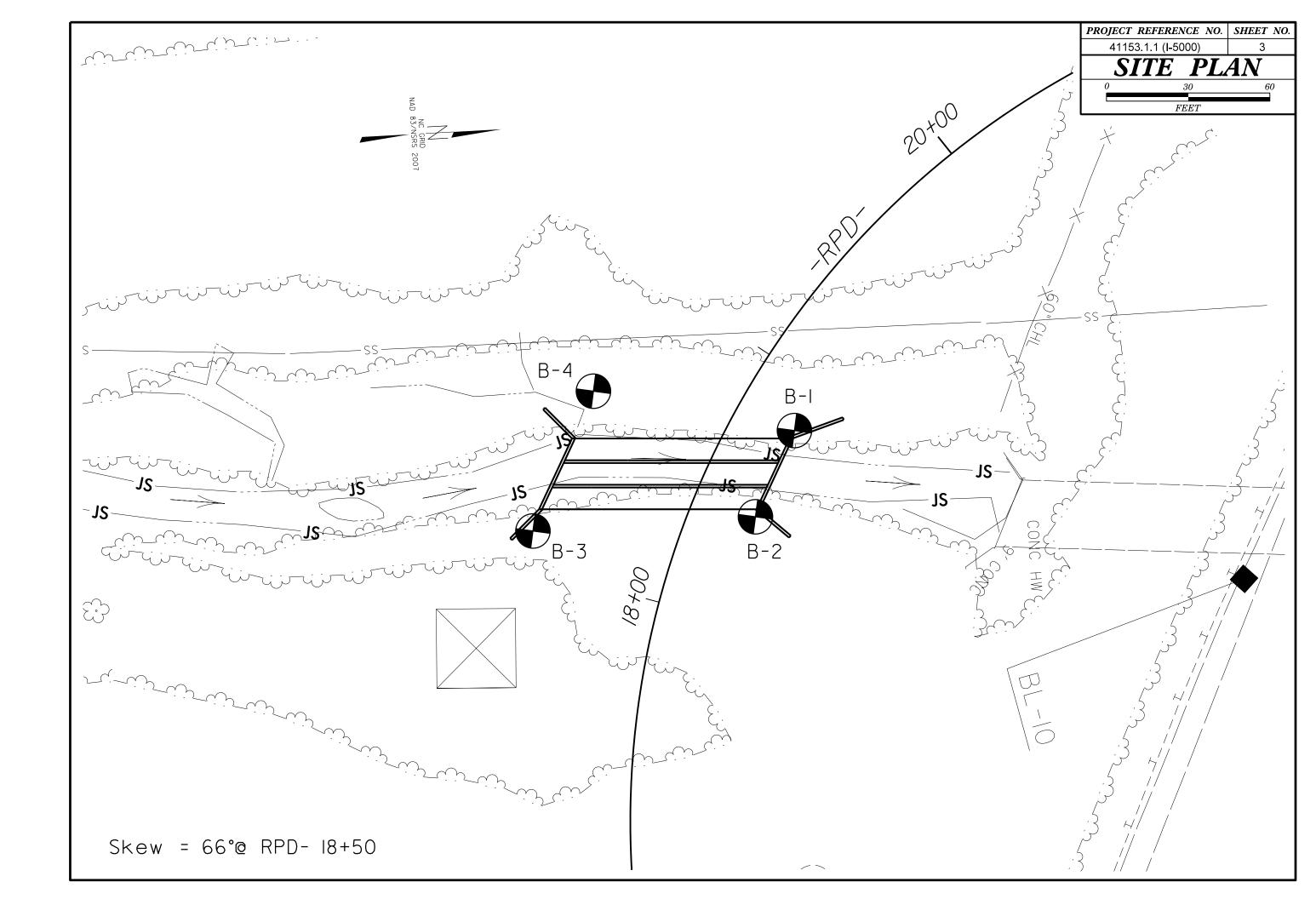
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS				
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF 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 IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	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	AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.				
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO AUL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING				
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: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.				
SOIL LEGEND AND AASHTO CLASSIFICATION		ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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				
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	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.	LINE TO COADE CADAIN SCHIEF, ETC.	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-7-5 A-7-6 A-7	COMPRESSIBILITY	NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.				
SYMBOL DOCOGOOOC	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED				
7. PASSING 10 50 MX SILT- GRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.				
■40 30 MX 50 MX 51 MN SOILS S	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 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL 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 HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE				
PASSING #40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.				
LL – – 40 MX 41 MN LITTLE OR HICHLY	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 OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.				
CROUP INDEX 0 0 0 4 MY 8 MY 12 MY 16 MY IND MY AMDINIS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE				
USUAL TYPES STORE FRACS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.				
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24_ HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM				
CEN BATING	\bigtriangledown PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.				
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	E	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.				
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.				
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	J <u>OINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.				
PRIMARY SOIL TYPE COMPACTNESS OR COMPACTNESS OR COMPACTNESS OR COMPACTNESS OR COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO				
(Invalue) (TUNS/FT)		SEVERE ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.				
GENERALLY VERY LOOSE < 4 CRANN AD LOOSE 4 TO 10	SOIL SYMBOL	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.				
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT CHAUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTILED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTILING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.				
(NON-COHESIVE) VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE				
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.				
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.				
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4		SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE				
HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A FIEZOMETER SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.				
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.				
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND				
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053		HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.				
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY (BLDR,) (COB,) (GR.) SAND SAND (SL.) (CL.)	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TUP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN. 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				
(BLDR,) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	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	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR COUGED 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 γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL				
	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{\rm d}$ - 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	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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 <u>SAMPLE ABBREVIATIONS</u>	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.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY				
(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 I 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 SEMISOLIDA BEOLIDES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.				
RANCE < - WET - (W) SCHIDGLON REGULTED INTRO TO (P) PL PLASTIC LIMIT	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING	BENCH MARK: See Note				
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET				
OM _ OPTIMUM 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 MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET					
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:				
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	Boring collar elevations derived using Geopak and the TIN file (i5000_ls_tin (2).tin)				
PLASTICITY	СИНЕ -55 СИНЕ -55 СОНКЕ SIZE:	INDURATION					
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.					
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST	CRAINS CAN BE SERARATED FROM CAMPLE VITU STEEL PROPE					
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.					
COLOR		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X Diedrich D-50 Core bit Vane shear test	DIFFICULT TO BREAK WITH HAMMER.					
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14				

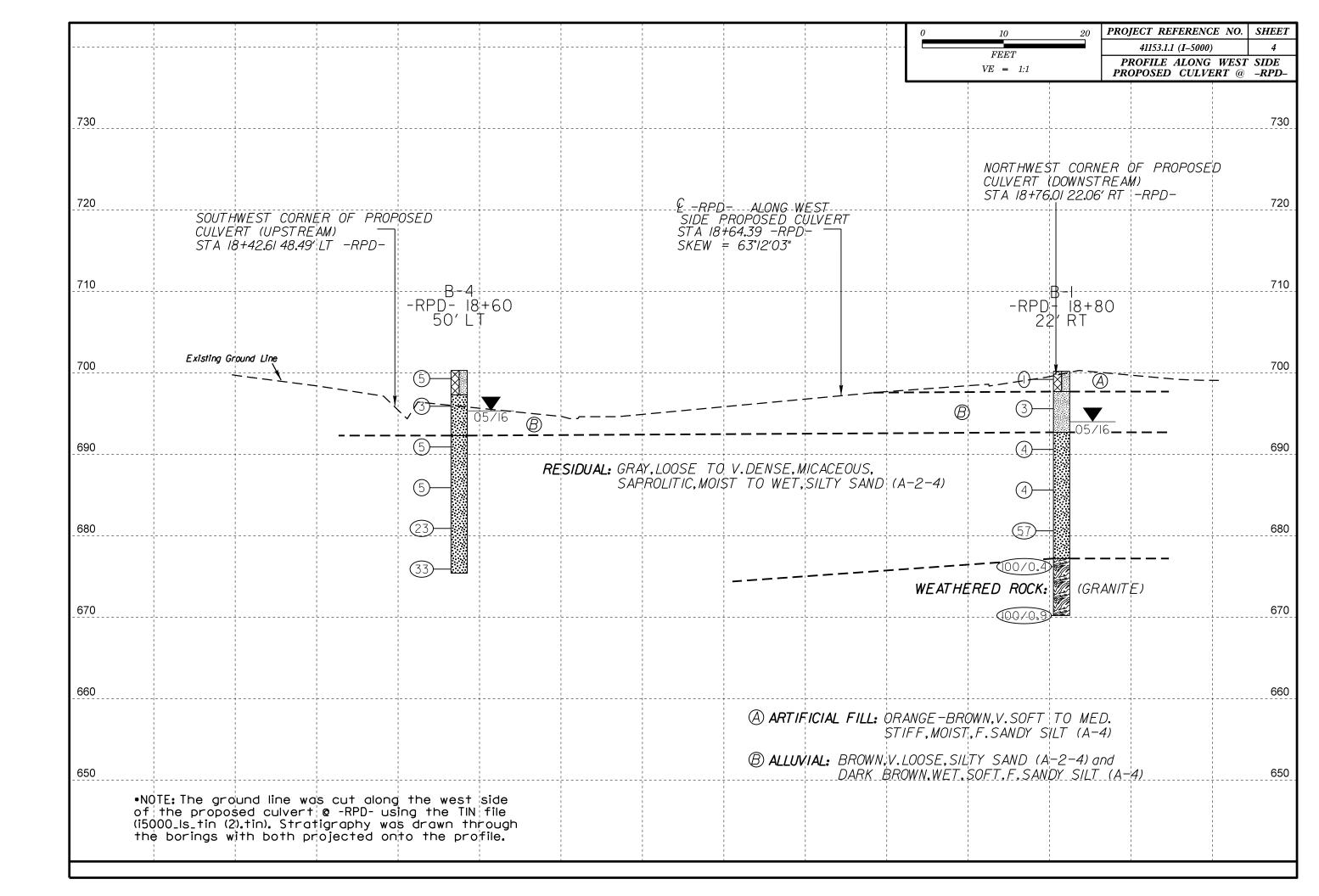
PROJECT REFERENCE NO.

41153.1.1

SHEET NO.

2





GEOTECHNICAL BORING REPORT BORE LOG

SITE DESCRIPTION I-85 / US 321 Interchange Geometric Safety Improvements (Culvert @ -RPD) GROUND WTR (t) BORING NO. B1 STATION 18+80 OFFSET 22.1 RT ALIGNMENT RPD 0 HR. 6.9 COLLAR ELEV. 700.2 ft TOTAL DEPTH 30.0 ft MORTHING 564.972 EASTING 1,347,433 24 HR. 6.2 DRILL RICHAMMER EFFJDATE SUM0030 EDERORH-06408% 1109/2015 DRILL METHOD HS Augers HAMMER TYPE Automatic DRILL RICHAMMER EFFJDATE SUM0030 EDERORH-06408% 1109/2016 SUBFACE WATER CEPTH NA ELEV (n) CILL RICHAMMER EFFJDATE SUM0030 DERORH-06408% 1109/2016 SUBFACE WATER CEPTH NA CILL RICHAMMER EFFJDATE SUM030 SDERORH-06408% 1109/2016 SUBFACE WATER CEPTH NA CILL VICHAMMER EFFJDATE SUM030 SDERORH-06408% 1109/2016 SUBFACE WATER CEPTH NA CILL VICHAMER EFFJDATE SUM030 SDERORH-06408% 1109/2016 SUBFACE WATER CEPTH NA CILL VICHA START DATE 05/26/16 SUBFACE WATER CEPTH NA CILL VICHA Q SUBAND ROCK DESCRIPTION 060.6 3.6 1 2 50 700 000 ATTRICIAL FLL Corange-brown, I. Sandy SILT (A-4) 25	
BORIMON D. 5-1 STATION 19-40 OPFSET 22 RT ALLONMENT BPD 948 60 COLLAR ELEV. 700.2 R STATION 19-40 COLLAR ELEV. 700.2 R TOTAL DEPTH 30.0 R MORTHING 564.972 EASTRIG 1.347.433 94.86 60 COLLAR ELEV. 700.2 R TOTAL DEPTH 30.0 R MORTHING 564.972 EASTRIG 1.347.433 94.86 60 DBLL ROHANDER EFF. AUTE SWEEDOND 05.895 TOTAL DEPTH 30.0 R MORTHING 566.972 MAMER TPE ALMONE SWEEDOND 38.85 TOTAL DEPTH 32.7 R DBLL ROHANDER EFF. AUTE SWEEDOND 05.895 STATT DATE 0522/16 DUEACE WATER DEPTH NA SWEEDOND 38.85 SWEED	JNTY
COLLAR ELEV. 700.21. TOTAL DEPTH 30.01 NORTHING 564,977 EASTING 1,347,433 24.HR 6.2 DBLLE Right, MMER EF, DATE SUX003 DEGROHD-30 89% 11052015 DRUL Right, MMER EF, DATE SUX003 DEGROHD-30 89% 11052015 DRUL Right, MMER EF, DATE SUX003 DEGROHD-30 89% 11052015 DRUL Right, MMER EF, DATE SUX003 DEGROHD-30 89% 11052015 DRUL Right, MMER EF, DATE START DATE OSCIANT DOULD AF LEV. 700 START DATE SUX003 DEGROHD-30 89% 11052015 OWN 0.00 START DATE DSCIANT DOULD AF LEV. 700 START DATE SUX005 DEGROHD-30 89% 11052015 OWN 0.00 START DATE DSCIANT DOULD AF LEV. 700 START DATE SUX005 DEGROHD-30 89% 11052015 TO DOULD AF LEV. 700 START DATE SUX005 DEFROIT DME SOL AD PORCE DEGRIFTON DEFROIT DME DME <thdme< th=""></thdme<>	ty Impr
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Boring Terminated at Elevation 670.2 ft In Weathered Rock (granite)	<u>'</u>
Boring Terminated at Elevation 670.2 ft In Weathered Rock (granite)	
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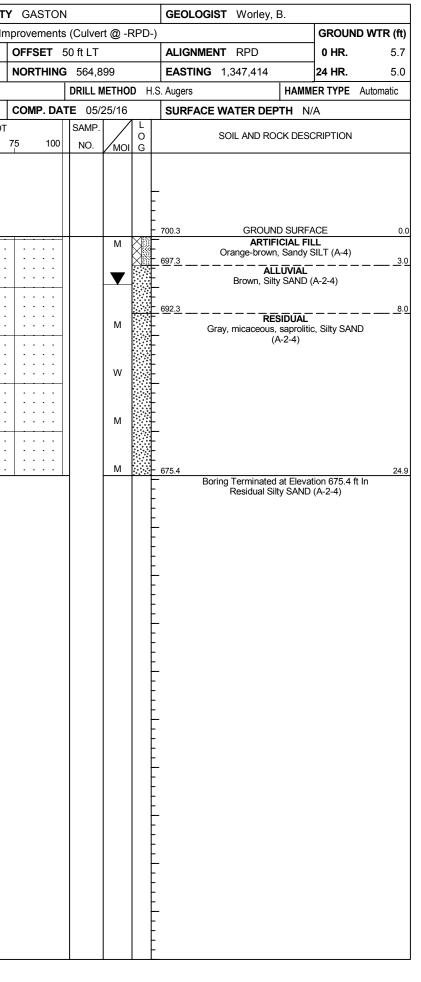
SHEET 5

T١	()	GAS	ST	10	N					GEOLOGI	ST Worley, I	3.									
Improvements (Culvert @ -RPD-)									-)				GROUN	ID WTR (ft)							
OFFSET 24 ft RT										ALIGNME	NT RPD		0 HR.	6.5							
	NC	DRT	H	INC	G	564,9	56			EASTING	1,347,464		24 HR.	6.3							
		DRILL METHOD H.S.								Augers		HAMM	ER TYPE	Automatic							
	СС	OMF	. I	DA	T	E 05/2	26/16			SURFACE	WATER DEP	TH N/.	A								
DT SAMP. L O											SOIL AND ROCK DESCRIPTION										
	75		1	00		NO.	моі	Ğ													
						SAMP.		0		700.1 Da 588.6 G	SOIL AND ROO GROUNI ALL Irk brown to brov color change at color change at ray, micaceous,	D SURFA UVIAL vvn, Silty \$ 11.5' in a SIDUAL saprolitic -2-4)	CE GAND (A-2 uger return	n) <u>11.5</u> ND 24.7							

GEOTECHNICAL BORING REPORT BORE LOG

WBS 411	153 1 1					~~~																					
	100.1.1				IP I-5	000		CC	UNTY	GAST	ON				GEOL	OGIST Worley, B.			WBS	41153	5.1.1			TI	P I-5000		COUNTY
SITE DESC	CRIPTIO	N I-8	5 / US	321 Ir	ntercha	nge G	eometr	ric Safe	ety Imp	proveme	nts (Cul	vert @	-RP	'D-)			GROUND WT	R (ft)	SITE	DESCR	IPTION	I 1-85	/ US :	321 Int	erchange	Geometri	c Safety Im
BORING N	NO. B-3			S	TATIO	N 18	+12			OFFSET	51 ft L	T			ALIGN	MENT RPD	0 HR.	7.5	BOR	ING NO.	B-4			S	ATION	18+60	
COLLAR E	ELEV . 7	01.1 ft		т	OTAL	DEPT	H 24.9	9 ft		NORTHI	NG 564	4,874			EASTI	NG 1,347,464	24 HR.	7.2	COL		EV . 70	00.3 ft		т	OTAL DEF	PTH 24.9	ft
DRILL RIG/H	HAMMER I	EFF./DA	TE S	JM009	3 DIEDR	ICH D-	50 88% 1	11/05/20)15		DRIL	L METH	IOD	H.S.	. Augers	HAM	MER TYPE Auton	natic	DRIL	RIG/HAI	MMER E	FF./DA	TE SI	JM0093	DIEDRICH	D-50 88% 1	1/05/2015
DRILLER	Bare, J.			s	TART	DATE	05/27	7/16		COMP. D	ATE (5/27/1	6		SURFA	CE WATER DEPTH	N/A		DRIL	LER B	are, J.			S		E 05/25/	16
		H BL	ow co	UNT			BLOW	S PER	FOOT		SAN	1P. 🔻				SOIL AND ROCK DE	SCRIPTION		ELEV	DRIVE ELEV	DEPTH	BLC	W CO	UNT		BLOWS	PER FOOT
(ft) (ft)		0.5ft	0.5ft	0.5ft	0	2	5	50	7	75 10	0 NC). M			ELEV. (ft)			PTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
705														L					705								
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700	\pm							<u> </u>								ALLUVIA Dark brown to brown, Silty	f. to cse. SAND		700	700.3	<u> </u>	1	2	3	• 5		
697.	.7 - 3.4	1	1	2								D				(A-2-4)				696.9	3.4				$ _{t}$		
695	Ŧ		.	-	$\left \left \begin{array}{c} \P^3 \right \right $								_	Ē		(color change at 11.5' ir	n auger return)		695	-		1	1	2	∮ 3 · · ·		
692.7	Ţ													F						-	-				1		
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687.	.7 - 13.4															RESIDUA Gray, micaceous, saprol (A-2-4)	L itic, Silty SAND			- 686.9 -	13.4						
685	Ŧ	1	1	3	• 4	•••	· · · · · ·		· · · · · ·			W				(A-2-4)			685	- 000.9	- 13.4	1	1	4	5	· · · · · ·	
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677.	.7 <u>+</u> 23.4] : `	VI I	· · · ·	: :	· · · · · ·											-	-					· / · · · · ·	
		4	6	9		• 15		• •		• • • •	Щ	M			676.2	Boring Terminated at Elev	vation 676.2 ft In	24.9		676.9 -	23.4	7	14	19		· ↓ · · · · ·●33· ·	

SHEET 6



SITE PHOTOGRAPH

Proposed Culvert At Sta. 18+50 -RPD-



View Facing North (Downstream) Along Tributary L-8 at Proposed -RPD- Culvert Location (*Photo taken from BSR*)

SHEET 7 41153.1.1 (I-5000) Gaston Co.