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REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN PROFILE(S) CROSS SECTION(S) BORE LOG(S) SITE PHOTOGRAPH(S)

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ALAMANCE

PROJECT DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE

SITE DESCRIPTION _

STATE PROJECT REFERENCE NO. STATE NO. SHEETS N.C. **B-5239** 9 1

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNG LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C, DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 NUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DETAILS SHOWN ON THE SUBSURFACE PLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- 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 REDUESTED 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.
- 2.

PERSONNEL

C.C. MURRAY

J.E. ESTEP

M.R. MOORE

INVESTIGATED BY <u>R.Q.</u> CALLAWAY

DRAWN BY _J.K. McCLURE

CHECKED BY _____C.B. LITTLE

SUBMITTED BY ______.

DATE OCTOBER 2014



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

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION		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.	RARD RUCK IS NUN-CUASIAL PLAIN MATERIAL THAT WUULD 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 DI586). SOIL CLASSIFICATION	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES INTE HELL AFFROMMETELT THE SAME SIZE.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - 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		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,	THE ANCHLARITY OR ROUNDNESS OF SOLL 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
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE	SURFACE,
	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) GNEISS, GABBRO, SCHIST, 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-2 A-2 A-2 A-3 A-6 A-7	COMPRESSIBILITY		COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
31/IDUL 0000000000		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 SILT- MICK		(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
-10 50 MX -40 30 MX 50 MX 51 MN S0 ILS COLLS PEAT		WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
•200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOLLS SOLLS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATIM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
PASSING *40	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	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 STONE FRAGS. THE OUT AND O	✓ 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 FRACTORE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SHING SHINE HIS SHING SHING SHIES		MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	VPW PERCHED WAIER, SAIUKATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	
	SPRING OR SEEP	WITH FRESH ROCK.	
		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FIELD.
		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 COMPACTNESS OR PENETRATION RESISTENCE 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
(N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION - OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL	(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.
GRANULAR LUOSE 4 TO 10 MEDIUM DENSE 10 TO 30 N/A		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) UTHER AUGER BORING (A) LUNE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50		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 RUCK WEATHERED TO A DEGREE THAT UNLY MINUR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IE TESTED WOULD YTELD SPT N VALUES < 100 BPE</i>	UF HN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SUFT 2 TU 4 0.25 TU 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOTIL ROCK FABRIC NOT DISCERNIBLE OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SUIL - SUIL FORMED IN PLACE BY THE WEATHERING OF RUCK.
MATERIAL STIFF 8 TO 15 1 TO 2		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 FOLIAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	ALLUVIAL SOIL BOUNDARY A PIEZUMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTORE ON ORAIN SIZE		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	EXCAVATION UNCLASSIFIED EXCAVATION - TAXA UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
UPENING (MM) 4.76 2.88 8.42 8.23 8.875 8.853	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY		MODERATELY CAN BE SCRATCHED BY KNIES OR PICK COUCES OR CROOVES 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	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	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.	A 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC γ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	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 GOLDE FOR FIELD HOLSTONE 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	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIEUES LAN BE BRUKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VENT LAN BE LARVED WITH KNIFE. LAN BE EXLAVATED READILY WITH POINT OF PICK, PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURF. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE C - WET - (W) SEMISULID; REQUIRES DRYING TO	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	RENCH MARK: BI -4
	HIHIGHLY V-VERY RATIO	TERM SPACING TERM THICKNESS	STA. 17+8L86 -L - 19.70 LT. = 20+86.84 -BL -
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N 885932.4497 E 1849425.3896 ELEVATION: 608.29 FEET
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NUTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER	VERT CLUSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 F 0.03 FEET THIN Y LAMINATED (0.008 FEET	SUL STRATIGRAPHY IS THROUGH THE BORINGS FOR PROFILE
		INDURATION	
PLHSTILIT		FOR SEDIMENTARY ROCKS INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING HEAT PRESSURE ETC.	
PLASTICITY INDEX (PI) DRY STRENGTH		RUBBING WITH FINGER FREES NUMEROUS CRAINS.	
SLIGHTLY PLASTIC 6-15 SLIGHT		FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM		GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEFL PROBE	
HIGHLY PLASTIC 26 OR MORE HIGH		MUDERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	
		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;	
	I LU / LU / LU / LU /	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



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SITE	DESCR	IPTION	BRID	DGE 1	26 ON	NC 87 O	/ER HAW I	RIVER MI	L RACE								GROUND WTR (1	it) SITE DESCRIPTION BRIDGE 126						26 ON	ON NC 87 OVER HAW RIVER			
BOR	ing no.	EB1-	A		S	TATION	18+70		OFFSET	11 ft LT			ALIC	GNMENT	-L-		0 HR. 4	0 В	BORING NO. EB1-B					ST	STATION 18+79			
COL	LAR EL	EV. 60	08.4 ft		т	OTAL DE	PTH 38.9	ft	NORTHIN	G 886,0	020		EAS	TING 1	,849,413		24 HR. 11.	0 C	COLLAR ELEV. 608.3 ft TOTAL DEPTH 40.2 ft									
DRIL	RIG/HAN	/MER EF	F./DAT	E HFO	00066 C	ME-550 81	% 03/19/20	4		DRILL	METHO	DD N	W Casing	w/ SPT		HAMM	ER TYPE Automatic	D	DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014									
DRIL	LER E	step, J.	E.		S	TART DA	TE 08/20/	14	COMP. DA	COMP. DATE 08/20/14 SURFACE WATER DEPTH N/A						A	D	DRILLER Estep, J. E. STA						START DATE 08/19/14				
ELEV	DRIVE	DEPTH	BLC				BLOWS	PER FOO	T 100	SAMP	. V			S	DIL AND RO	OCK DES	CRIPTION	EL	.EV	DRIVE ELEV	DEPTH				0 (BLOWS P	PER FOOT	
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SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE GROUND WTR (ft) SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER BORING NO. EB2-A STATION 19+39 OFFSET 12 ft LT ALIGNMENT -L- 0 HR. 3.0 24 HR. FIAD 0 HR. 3.0 COLLAR ELEV. 608.6 ft TOTAL DEPTH 42.6 ft NORTHING 886,087 EASTING 1,849,396 24 HR. FIAD COLLAR ELEV. 608.5 ft TOTAL DEPTH 43.3 ft DRILL RIGHAMMER EFF./DATE HF00066 CME-550 81% 03/19/2014 DRILL METHOD NW Casing w/ SPT HAMMER TYPE Automatic DRILL RIGHAMMER EFF./DATE HF00066 CME-550 81% 03/19/2014 DRILLER Estep, J. E. START DATE 08/20/14 COMP. DATE 08/20/14 SURFACE WATER DEPTH N/A DRILL RigHAMMER EFF./DATE HF00066 CME-550 81% 03/19/2014 DRILL W DEPTH H BLOW COUNT BLOW SPER FOOT NO. SOIL AND ROCK DESCRIPTION DEPTH (ft) ELEV (ft) DEPTH (ft) BLOW COUNT BLOW SPER FOOT SOIL AND ROCK DESCRIPTION DEPTH (ft) ELEV (ft) DEPTH (ft) ELEV (ft) <t< th=""><th>UNT</th></t<>	UNT					
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Boring Terminated WITH TRI-CONE REFUSAL at Elevation 566.0 ft IN						





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REFERENCE

<u>SHEET NO.</u>	DESCRIPTION
I	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE(S)
5-9	CROSS SECTION(S)
10-17	BORE LOG(S) & CORE REPORT(S)
18-23	CORE PHOTOGRAPH(S)
24	SITE PHOTOGRAPH(S)

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ALAMANCE

PROJECT DESCRIPTION BRIDGE 119 ON NC 87 OVER HAW RIVER

SITE DESCRIPTION .

42841 PROJEC

STATE PROJECT REFERENCE NO. STATE NO. SHEETS 24 N.C. **B-5239** 1

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 SOL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 NUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DETAILS SHOWN ON THE SUBSURFACE PLANS ARE DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- 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 REDUESTED 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.
- 2.

PERSONNEL

C.C. MURRAY

J.E. ESTEP

M.R. MOORE

- INVESTIGATED BY <u>R.Q.</u> CALLAWAY
- DRAWN BY _J.K. McCLURE
- CHECKED BY _____C.B. LITTLE
- SUBMITTED BY ______.
- DATE OCTOBER 2014



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.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOLL 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 RETWEEN SOIL AND ROCK IS DETEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
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,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	RUCK MATERIALS ARE TYPICALLY DIVIDED AS FULLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED V//// NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE AROVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	CONSTANT WE SHIT FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200) URGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	RYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	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.	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 A-7-6 A-7-7 A-7-6 A-7-6 A-7		ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	<u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COORDOCCO	MODERATELY COMPRESSIBLE LL C 31 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	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SET SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
10 50 MX GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 56 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS OTHER MATERIAL</u>	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATOM OR ANY PLANAR FEATORE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 10 MX 10 MX 10 MX 10 MX 11 MN 11 MN MODERATE HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX Ø Ø Ø 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOULS	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 STONE FRAGS. EINE STUTY OF CLAVEY STUTY CLAVEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO UNE ANUTHER PARALLEL TO THE FRACTORE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT RORTIONS OF ROCK SUDW DISCOLORATION AND WEATHERING FEELTS IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLUSELT SPACED PARALLEL PLANES.
	·····································	(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		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.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	U-UU- SPRING OR SEEP		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	25/025	(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 ²)	WITH SOIL DESCRIPTION	SEVERE ALL ROCK EXCEPT DUARTZ DISCOLORED OR STAINED ROCK EARRIC CLEAR AND EVIDENT RUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE < 4		(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A RODY OF SOLL OR BOCK THAT THINS OUT IN ONE OR MORE DIRECTIONS
GRANULAR LOOSE 4 TO 10		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULARI Y MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOTLS
MATERIAL DENSE 10 TO 30 N/A			USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NUN-CUHESIVE) VERY DENSE > 50		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 O CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	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 SOTIL, 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		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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY A INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
	IXXI UNDERCUT IZZI UNCLASSIFIED EXCAVATION - IXXI UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ACCEPTABLE, BUT NOT TO BE		RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CCE SD.) (SAND (SL.) (CL.)		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
		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF RUDWS (N OR RPE) OF
SIZE IN. 12 3	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.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
	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
SOIL MOISTURE SCALE FIELD MOISTURE	CSE COARSE ORG ORGANIC		STRATA CORE RECOVERY (SREC) - TOTAL ENGTH 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	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	RENCH MARK, RI -4
	HIHIGHLY V-VERY RATIO	TERM SPACING TERM THICKNESS	STA. 17+81.86 -L- 19.70 LT. = 20+86.84 -BL-
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N 885932.4497 E 1849425.3896 ELEVATION: 608.29 FEET
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NULS:
- URY - (U) ATTAIN OPTIMUM MOISTURE	6" CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	AND CROSS-SECTIONS.
PLASTICITY	1 Ш 8° HOLLOW AUGERS П-В Р-Н Р	INDURATION	
	X CME-550 HARD FACED FINGER BITS X NO /NO	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;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDUM	AND TOOLS:	VENILE BLUW BY HAMMER UISINIEGRAIES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PRODE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).		SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOUR LEAS SUCH AS LIGHT, DANK, STREAKED, ETC. MAE USED TO DESCRIBE HEREARANCE.	I L J / L J / L J / L J /	EATREMELT INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.



2





		PROJ	SHEET								
50	100		42841.1.1 (B-5239)								
FEET V.E.	= 5:1		Brid	Profile –L ge 119 on j	NC 87						
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	1										
	 	 	 	 		620					
REMOVE	1										
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N.W.S.=	602 . 6										
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. ABUTMENT											
	 i										
	1					500					
I	1										
RED GRANITE											
ALS						580					
BORING DESCRIF	PTIONS										
IAL, DARK GRAY AND	BROWN	MOIST	LOOSE	CLAYEY	SAND						
RED ROCK	NGE SAL		<i>RAVEL</i>								
AL -V. DENSE -SHITY-SA	₩D₩⁄₽	ROCK- FR	AG S	 	 	57_0					
RED ROCK	1										
LIGHT TAN DRY SOFT EACH- S AND	T NON	PLASTIC	SAND		, , ,						
L 4'-8' EMBANKMENT	, CRUSH	ED STO	NE								
L RED ORANGE MOIS	ST DEN	SE TO V	ERY DEN	VSE							
ALLINE ROCK SEAM	@ 9.1										
ROCK 12.4'-13.7' RESID	DUAL BO	ULDER	T								
E CLAYEY SAND	H51-VE1	tr- <i>DE</i> NS	£								
ALLINE ROCK, PORPHY	YRITIC (GRANITE	REC = 89	% RQD=	89%						
)WITH - VERY - POORH	RECOVE	₹¥, PROB	ABLYRE	SIDUAL-	SOH:						
ALLINE ROCK, FINE G	RAINED	GRANU	LITE, RE	C=81% R	$QD = 80^\circ$	То					
UAL, DARK - GRAY- WET ED MAFIC DIKE	-VERY	DENSE-1	₩ON- PLA	STIC - GR	AVEL						
IAL GRAY MOIST LOC	DSE NO	N PLAST	IC SILTY	SAND							
	2	0				21					



		PROJE	ECT REI	FERENCI	E NO .	SHEET
10	20		42841.1.1	(B –5239)		5
FEET	1.1		Section T Sta. 14	hrough En +92 –L– (d Bent C W.P. #1)	Ine
V.E.	= 1.1	;	Ske	ew = 90	Deg.	
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$T _{V} SOFT$						610
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		ו ו 		 		600
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EDIUM DENSE SAND				 		
TE WITH TALS		1		1		
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		1		1		570
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40	50	1		1		
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																	PROJE	ECT REFERENCE	NO. SHEET
											1	0		10		20		42841.1.1 (B –5239)	6
					-+		+							FEET	VF	- 1.1		Section Through L Sta. 15+62 –L– (1	Bent One W.P. #2)
															V.L	. – 1.1		Skew = 90	Deg.
	 	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	· · · · · · · · · · · · · · · · · · ·		- 		 	 		 	ו ו 							 	
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610		, , , , , , , , , , , , , , , , , , ,	, , , , , , , , , , , , , , , , , , ,		-+					· · · · · · · · · · · · · · · · · · · ·									610
						·	<u>BRIDGE</u>	<u>DECK</u>			1								
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						BI-A 15+62 -L-		15 + 15	31⊢B 6¦3 –L−										
590						14 LT. FLEV 583 9		10 FLE) RT. 1V 584 1										500
	-	+ 		0'–2.6'	ALLUVIUM		+ 		<u>, 00±1</u>	· + 			·····			<u> </u>		+	
				MED. SAND	DENSE TO & GRAVE	DENSE		_											
			WATE	$R SURFACE \bigtriangledown 9$			<u>GROUND</u>	SURFACE		ALLUVIU	M		·						
								<u>//0M</u>	WEA	THERED	ROCK 1	1 <u>' - 2.4</u> ' WE	ATHER	ED ROCK					
580		+	<u> </u>	<u>6'-3.4</u> ' W <u>EATHEREI</u> // <u>=</u> // <u>=</u> // <u>=</u> //	<u> </u>			₩ <u>=₩</u> =₩ <u>=</u> ₩ <u>=</u> ₩ ROCK	2.4 ² -6	.1'-FINE -6	RAINED	=///=///=///= -UNFOLIAT	ED- GR	E///_E///_E// ANULITE-	-TOAM	, PHIBOLITI	£		<i>580</i>
				$-5.1^{\circ} GRANULITIC$	META GR4 ≓ <u>76%</u> _RQD	D = 44%			REC=	<u>100%</u> <u>R</u> Q	D = 100%								
		 +		5.1'-10.1' GRANITE	AND GRAD	NULITE $C = 85\%$	 +	 +	6.1'–1		GRAINED	UNFOLIAT	ED GF	RANULITE	TO AN	MPHIBOLIT.	E		
						QD = 85%			REC RQD	=99% =199% i									
570				SOME GRAD	NULITE ZO	NES			11.1'–I	6.1' FINE	GRAINEL	UNFOLIA	$TED \dot{G}$	RANULITE	E TO A	MPHIBOLIT	TE		570
		+ 		·		D = 90%	± I I I I I I I I I I I I I I I I I I I		REC=	- 106% 			·				لــــــــــــــــــــــــــــــــــــ		<i>5/9</i>
				15.1'–20.1' GR SOME GRAI	ANITE POI NULITE ZO	RPHYRY NES			16.1'-2	21.1' FINE	GRAINE	UNFOLIA	$TED \dot{G}$	RANULIT	ΈΤΟ Α	MPHIBOLII	ΓE		
		; ; ; , , , , , , , , , , , , , , , , ,			$- \frac{RE}{RQ}$	C = 104% D = 96%	÷	 	REC=	-104%	י ר ר י		· +	·					
						\overline{BT}	1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I		RQD = BT	104%	 								
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			70	- JU		, 1			10			50		40					



				PROJ	E NO.	SHEET						
	10		20		42841.1.1 (B -5239)							
	FEE	Г 			Section Sta. 16	Through +32 -L- (Bent Two W.P. #3)					
		V.L.	- 1:1		Sk	ew = 90	Deg.	1				
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								 					42841.1.	1 (B-5239) n Through Bent Thre	8
			1			+		 			FEE1	V.E. = 1:1	Sta. 1 Sta. 1	7 + 02 - L - (W.P. #4) kew = 90 Deg.)
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600			E E	33–A		; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	· · · · · · · · · · · · · · · · · · ·		B.	B-B					600
			17+ 24	07 –L– 4 LT.	 	I I I I I I I I		1 1 1	17 + 0 26	$\begin{array}{c} 9 & -L- \\ RT. \end{array}$	I I I I I I I				
		·	ELE	V. 590.9	 	' ' + + 	 		$\dots ELEV$. 592.0			 		
						GROUND	<u>SURFACE</u>			on — —					
590	0'-4' ALLUVIAI LIGHT TAN I CONSTITUTION	L DRY SOFT NON	PLASTIC SAND	000				; 		00 00 00 00 00 74	8' ALLUVIAL	= +	SE NON PLASTIC	SAND	<i>590</i>
						ALLU	VIUM				S <u>TITUENC</u> Y	<u>ŎF BĔAĊĤ Š</u>	AND.		
		ARTIFICI	IAL FILL' OU BANKMENT D STONE	X00-09/14							<u>4.8'–8.7' CRYS</u> LIMITS UNC	TALLINE_RO ERTAIN	CK, RESIDUAL_BC	DULDER	
500	8'-12.4' RESIDUAL RED ORANGE MOIST DEN	NSE TO VERY L	DENSE 007.4			RES	IDUAL				14.1' RESIDUA	AL ARD WEATHE	RED DIABASE D	IKE	500
380		OARSE-SAND NE ROCK SEAM			<i>12 4'−13 7</i> ′	CRYSTALLINE R	ОСК	 !							<i>580_</i>
	13.7'-15.4' RESIDUAL RED ORANGE MOIST VEI NON DI ASTRI OLAVEN (C	RY DENSE	< <u>∭≣∭≣</u> ∭	<u>,,,,,,,</u> ,≣,,,	RESIDUA	L BOULDER					14.1'–16' CRYS	TALLINE ROO	CK, NO CORE RE	COVERY	
		OANSE SAND			15.4'-18.7 PORPHY	CRYSTALLINE R RITIC GRANITE	OCK			16' - 16' - 16'	22.5' RESIDUA	L DARK GRA	AY MOIST CLAYE	Y SANDY GRAVE	 L
570	18 7'-93 7' COBED	WITH VERY P	OOR RECOVERY	000	E = 89	$\% \ RQD = 89\%$			0000	(4 9) TRA	NSITION FR	OM RESIDUA	AL SOIL TO ROC	ĽK	570
	PROBABLY RESI REC=7% RQD=0	DUAL SOIL		0000	23.7'-25.7 FINE GI	r CRYSTALLINE 'R LAINED GRANULI A ROD-900	OCK				;=///=///=///=/// CRYSTALLI	VEROCK			<i></i>
			\					₩ <i>ΞⅢΞ</i> ⅢΞ		23¦3'–25.7' I REC=48%	'INE GRAINE RQD=48%	D GRANULIT	<u>È</u>		
	25.7'-28.7' RESIDUAL DARK GRAY WE' PROBABLY WEATHERED MAFIC DIKE	T NON PLASTIC	C GRAVEL 87	000 000 000			LINE ROUM			$\begin{array}{c} 25,7^{\prime}-28.9^{\prime}T\\ \underline{REC}=102\%\\ \end{array}$	$\frac{1}{RQD} = 93\frac{6}{7}$	D GRANULIT	E		
560	///	/ <u>=///</u> =/// <u>=///</u> =/// <u>=//</u> 28.7'-33.7'			// <i>=///-///</i> 	, ; , , , , , , , , , , , , , , , , , ,	· · · · · · · · · · · · · · · · · · ·	 		28.9'-33.9' F REC = 103%		U GRANULIT.	Ľr : 1 1 1 1		560
		FINE GRAIN	= 57% RQD = 32%							KQD = 103% 33'9' - 38'9' F	INE GRAINF	D GRANILIT	Ŕ		
		33.7'–38.7' FINE_GRAIN	ED_GRANULITE_					; 		REC=104%					
	_		$\begin{array}{c} REC = 85\% \\ RQD = 21\% \end{array}$												
550		38.7'–43.7' FINE_GRAIN	ED_GRANULITE_	Ś		, , , , , , , , , , , , , , , , , , ,	· · · · · · · · · · · · · · · · · · ·					 	· · · · · · · · · · · · · · · · · · ·		550
	-		$REC = 101\% \\ RQD = 100\% $		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		 	, , , , , , , , , , , , , , , , , , ,						
		43.%–49.1' FINE _ GRAIN			 	 		 				 			
			$\begin{array}{c} REC = 95\% \\ RQD = 94\% \end{array}$					1 1 1							
				<i>B'I</i> '	 	; 4		; J				 			
	50	40	30	2	0 1	0	0 1	10	20	30	40		50		
								i -					1	. I	



		PROJ	ECT REI	FERENCI	E NO .	SHEET
10	20		42841.1.1	(B -5239)		9
FEET	1.1		Section T Sta. 17	hrough En +77 –L– (d Bent T W.P. #5	wo
V.E.	= 1:1		Ske	ew = 90	Deg.	
+	+-					
+	+-					620
i i i i i i i i i i i i i i i i i i i						
						(10
+						<i>610</i>
+	+-					
		 				600
`+_						
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N [†] MEDIUM ⁺ - DENSE	TO DENS	SE				<i>590</i>
SILTY SAND EMNANT ROCK TEX	TURE					
						500
+	+-					<i>\</i> _
						1
+	 +-					
						570
	+-					
				 		560
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	+-					<i>550</i>
			1			
40	50		 			
1 1						1

WB	S 4284	1.1.1			TI	P B-5239		COUNT	Y ALAMAN	CE			G	EOLOGIST Murray, C	. C.		WB	3 42841	.1.1			TIF	B -5239		COUNTY
SIT	E DESC	RIPTION	BRID)GE 11	9 OVE	er haw ri	VER ON H	IIGHWAY	87 BETWEE	EIN SR '	1530 A	ND S	SR 15	576		GROUND WTR (ft)	SITE	DESCR	IPTION	BRID	DGE 11	9 OVE	R HAW RI	VER ON H	IIGHWAY
BOF	ring no	. EB1-/	4		S	TATION 1	4+94		OFFSET '	11 ft LT			A	LIGNMENT -L-		0 HR. 15.0	BOF	nd No.	EB1-I	3		ST	ATION 14	4+97	
COI	LAR EL	. EV. 60	8.4 ft		т	OTAL DEP	TH 23.4 ft	:	NORTHING	885,6	55		E	ASTING 1,849,502		24 HR. FIAD	COL	LAR ELE	EV. 60	8.2 ft		тс	TAL DEPT	TH 25.8 ft	:
DRIL	.L RIG/HA	MMER EF	F./DATI	E HFO	0066 C	ME-550 81%	03/19/2014	ŀ		DRILL	NETHO	D N	W Cas	sing w/ SPT	НАММ	IER TYPE Automatic	DRIL	L RIG/HAN	IMER EF	F./DATE	E HFO	0066 CI	ME-550 81%	03/19/2014	ŀ
DRI	LLER	Estep, J.	E.		S	FART DATI	E 08/26/1	4	COMP. DA	TE 08/	26/14		S	URFACE WATER DEP	TH N/	/Α	DRI	LER E	step, J.	E.		ST		E 08/21/1	4
ELE	/ DRIVE	DEPTH	BLC	w col	JNT		BLOWS	PER FOOT	Г	SAMP				SOIL AND ROO	CK DES	CRIPTION	ELEV	DRIVE	DEPTH	BLO	w col	JNT		BLOWS	PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	I G	ELE	EV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 :	25	50
610		 + 				.	1	1					- 608 -	3.4 GROUNE ROADWAY I	D SURF	ACE 0.0	610		-						
605	605.7	2.7	2	2	2			· · · · ·	· · · · ·		м			0' -10' EMBANKME WET, SOFT CLA' TOP. (POSSIE	ENT, RE Y WITH BLE RO	ED, MOIST TO I GRAVEL AT AD BED).	605	605.5	2.7	1	1	2	1		· · · · ·
600	600.7	- - - - - - -	2	2	1	 	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		w		- - - <u>598</u>	3.4 ALL	UVIAL	10.0	600	600.5	- - - 7.7 -	2	6	6	12. 		
595	595.7	<u>+</u> 12.7	4	4	5	·\···					w		- - 594	10' - 14.2' ALLUVI BROWN, MOIST, Lo 4.2	AL, DAF OOSE (RK GRAY AND CLAYEY SAND. 14.2	595	595.5	12.7	3	4	3	$\begin{array}{c} \cdot & L & \cdot & \cdot \\ \cdot & I & \cdot & \cdot \\ \hline \phi_{\overline{1}} & \cdot & \cdot \\ \hline \phi_{\overline{1}} & \cdot & \cdot \\ \hline \end{array}$		· · · · ·
590	590.7	+ + + 17.7 + +	3	3	3	• • • • • • • • • • • • • • • • • • •		· · · · ·	· · · · · · · · · · · · · · · · · · ·		w			RES 14.2' -22' RESIDUA LOOSE, NON PLAS	Sidual Al, Ligh Stic, Gf	HT TAN, WET, RANITIC SAND.	590	590.5 - 	- - - - -	3	2	6			
	585.7	22.7	31	60/.1		<u> </u>	<u>+1</u>		60/.1				586 585 585	5.4 5.2 RES 5.0 22' - 23.2' RESIDU MOIST, DENSE, N	SIDUAL JAL, DA	22.0 23.2 ARK BROWN, 23.4 ASTIC SILTY	585	585.5 -	22.7	6	8	8	• • • • • • • • • • • • • • • • • • •	· · · · ·	
NCDOT BORE DOUBLE B5239_GEO_BH_BRDG0119.GPJ NC_DOT.GDT 10/27/14														SAND. HIGHLY W Ri 23.2' -23.4' SPT Boring Terminate REFUSAL at EI CRYSTAL	VEATH OCK. LINE REFUS ad WITH levation LLINE R	ERED MAFIC ROCK SAL, ROCK. 1 TRI-CONE 585.0 ft IN ROCK									



00 420-	41.1.1		/ \ I I		P B-5239		COUNT	Y ALAMA	NCE			GEOLOGIST Murray, C. C.	
TE DESC	RIPTIO	BRI	DGE ′	119 0\	/ER HAW R	IVER ON	I HIGHW	AY 87 BET	WEEIN	SR 153	30 AM	ND SR 1576	GROUND WT
ORING NO	D. B1-A	4		S	TATION 15	+62		OFFSET	14 ft LT			ALIGNMENT -L-	0 HR.
OLLAR EI	_EV. 5	83.9 ft		т	OTAL DEPT	H 20.1 f	t	NORTHIN	G 885,7	/20		EASTING 1,849,483	24 HR.
RILL RIG/H	AMMER E	EFF./DA	TE HA	-00066	CME-550 81%	6 03/19/20)14		DRILL	METHO	D N	W Casing W/SPT & Core HAI	MMER TYPE Autom
RILLER	Estep, J	l. E.		S	TART DATE	09/04/1	4	COMP. D	ATE 09/	04/14		SURFACE WATER DEPTH	N/A
EV DRIVE t) CLEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	UNT 0.5ft	0 2!	BLOWS	PER FOOT 50	75 100	SAMP. NO.	моі	L O G	SOIL AND ROCK D	ESCRIPTION
55						<u></u>	1	· · · · ·				583.9 GROUND SU	
30		10	13	24	· · · · ·	<u>37</u>		· · · · · ·		w		- 581.3 0 - 2.6 ALLUVIUM MED. I - 580.5 SAND & GR - 578.8 2.6' - 3.4' WEATHERED	DENSE TO DENSE AVEL ROCK ROCK, REFUSAL
'5	‡ + +					· · · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·	- F <u>S-B1-A</u>	1		AT BAS CRYSTALLINE 3.4' - 5.1' CORE	E ROCK D ROCK
o	+ + + +				· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · ·			R <u>S-B1-A</u>	f2		<u>573.8</u> <u>5.1' - 10.1' CORI</u> - CRYSTALLINE - 10.1' - 15.1' COR	ED ROCK
						· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				568.8 CRYSTALLINE 15.1' - 20.1' COR	ED ROCK
5	+										المرجم ا	_ 563.8	
	╸┥╺╶╶╶╶╶┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙┙												

NCDOT GEOTECHNICAL ENGINEERING UNIT

\sim					U 11											
WBS	42841	.1.1			TIP	B-523	39	C	OUNT	ΥA	LAMANC	E	GEOLOGIST Murray,	C. C.		
SITE	DESCR	IPTION	BRI	DGE 119	OVE	R ΗΑΜ	V RIVER	ON H	GHW	AY 8	7 BETWE	EEIN SR 1530 ANI	D SR 1576		GROUND	NTR (ft)
BORI	NG NO.	B1-A			STA	rion	15+62			OF	FSET 14	1 ft LT	ALIGNMENT -L-		0 HR.	N/A
COLL		EV. 58	3.9 ft		тот	AL DE	PTH 20	.1 ft		NO	RTHING	885,720	EASTING 1,849,483		24 HR.	N/A
DRILL	RIG/HAM	MMER E	FF./DA	TE HFOO	066 CM	IE-550	81% 03/1	9/2014			[[DRILL METHOD NW	Casing W/SPT & Core	HAMM	ER TYPE Au	tomatic
DRILI	ER E	step, J.	Ε.		STAP	RT DA	TE 09/0	4/14		со	MP. DATE	E 09/04/14	SURFACE WATER DEP	PTH Ν/	A	
COR	SIZE	NO			TOT	AL RU	N 16.7 f	t								
ELEV	RUN ELEV	DEPTH	RUN	DRILL RATE	REC.	JN RQD (ff)	SAMP.	REC.	ATA RQD (fft)	L O		D	ESCRIPTION AND REMARK	s		
	(ft)	(1)	(10)	(Min/ft)	%	%	NO.	%	%	G	ELEV. (ft)					DEPTH (ft)
580.48	580.5	- 3.4	1.7		(1.2)	(1.0)		(1.3)	(0.7)				Begin Coring @ 3.4 ft CRYSTALLINE ROCK			3.4
ł	5/8.8	<u> </u>	5.0		72%	61%		76%	44% (4 3)		- 578.8	3.4' - 5.1' FRESH, H	ARD, WIDELY FRACTUREE GRANITE.), GRANU	ILITIC META	5.1
575	4	-			100%	100%		85%	85%		-	R1 RMR=	=15, R2=8, R3= 20, R4= 20,	R5=4		
5/5	573.8	10.1					RS-B1-A-1 RS-B1-A-2				L		CRYSTALLINE ROCK			
	-	-	5.0		(5.0) 100%	(4.8) 96%	·	(5.3) 106%	(4.5) 90%		-	5.1 - 10.1 PRESH	ITE, GRANITE AND GRANU	LITE.	, GRAT AND	
570		-									-	RMR 89, V	=15, R2=20, R3= 25, R4= 25, ERY GOOD ROCK, CLASS I	R5≈4 I, TYPE D	& E	
ł	- 568.8	- 15.1	5.0		(5.0)	(5.0)		(5.2)	(4.8)		<u>- 568.8</u>	POINT LOAD S	CRYSTALLINE ROCK	(SF, 8.6)	: 202KSF	<u>15.1</u>
565	-	-			100%	100%		104%	96%		-	10.1' - 15.1' FRESH WHITE, GRAN	, VERY HARD, WIDELY FRA ITE PORPHYRY, SOME GRA	CTURED	, GRAY AND ZONES.	
305	563.8	20.1									563.8	R1: RMR 94	=15, R2=20, R3= 30, R4= 25, VERY GOOD ROCK, CLASS	R5=4	F	20.1
	4	-									- (L -	45.41 00.41 EDEOU	CRYSTALLINE ROCK			-
	4	-									-	WHITE, GRAN	TE PORPHYRY, SOME GR	ANULITE	ZONES.	
	+	-									- [RMR 94,	=15, R2=20, R3= 30, R4= 25, VERY GOOD ROCK, CLASS	R5=4 3 II, TYPE	E	
	4	-									-	Boring Terminate	ed at Elevation 563.8 ft IN CR	YSTALLI	NE ROCK	
	-	-									-					
	-	-									-					
	-	-									-					
	4	-									-					
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	4	-									-					
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	1	-									-					

WBS 42841.1.1	TIP B-5239 COUNTY	ALAMANCE	GEOLOGIST Murray, C. C.	
SITE DESCRIPTION BRIDGE 119	OVER HAW RIVER ON HIGHW	AY 87 BETWEEIN SR 1530 AN	ID SR 1576	GROUND WTR (ft)
BORING NO. B1-B	STATION 15+63	OFFSET 10 ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 584.1 ft	TOTAL DEPTH 21.1 ft	NORTHING 885,727	EASTING 1,849,506	24 HR. N/A
DRILL RIG/HAMMER EFF./DATE HF000)066 CME-550 81% 03/19/2014	DRILL METHOD N	V Casing w/ Core HAMM	ER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/03/14	COMP. DATE 09/03/14	SURFACE WATER DEPTH N/	A
ELEV (ft) DRIVE ELEV (ft) DEPTH (ft) BLOW COUNT 0.5ft 0.5ft 0.5ft 0.5ft	T BLOWS PER FOOT .5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DESC	CRIPTION DEPTH (ft)
		Image: state	584.1 GROUND SURFA 583.0 ALLUVIAL 581.7 0 - 1.1' ALLUVIU 581.7 WEATHERED RC 1.1' - 2.4' WEATHERED RC 578.0 2.4' - 6.1' CORED R CRYSTALLINE RC 6.1' - 11.1' CORED F 573.0 CRYSTALLINE RC 568.0 CRYSTALLINE RC 568.0 CRYSTALLINE RC 563.0 CRYSTALLINE RC 563.0 CRYSTALLINE RC - CRYSTALLINE RC - S63.0 - CRYSTALLINE RC - S63.0 - CRYSTALLINE RC - CRYSTALLINE RC - CRYSTALLINE RC - CRYSTALLINE RC - - - - - - - - - - - - - - - - - - - - - - - - -	ACE 0.0 JM 1.1 JCK 0 D ROCK 0 DCK 0 DCK 0 DCK 0 DCK 0 DCK 0 DCK 0 ROCK 11.1 DCK 16.1 DCK 21.1 Ion 563.0 ft IN 0 DCK 10

SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEIN SR 1530 AND SR 1576 GROUND W BORING NO. B1-B STATION 15+63 OFFSET 10 ft RT ALIGNMENT -L- 0 HR. COLLAR ELEV. 584.1 ft TOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HOTAL RUN 18.7 ft DRILL ROTAL RUN 18.7 ft CORE SIZE NO TOTAL RUN 18.7 ft DESCRIPTION AND REMARKS STRATA (ft) RUN (ft) STRATA (ft) STRATA (ft) STRATA (ft) DESCRIPTION AND REMARKS </th <th>R (ft)</th>	R (ft)
BORING NO. B1-B STATION 15+63 OFFSET 10 ft RT ALIGNMENT -L- 0 HR. COLLAR ELEV. 584.1 ft TOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HF00066 CME-550 81% 03/19/2014 DRILL METHOD NW Casing w/ Core HAMMER TYPE Auto DRILLER Estep, J. E. START DATE 09/03/14 COMP. DATE 09/03/14 SURFACE WATER DEPTH N/A CORE SIZE NO TOTAL RUN 18.7 ft ELEV (ft) DEPTH (ft) RUN (ft) RATE (Min/ft) SAMP. NO. STRATA NO. L 0 (ft) DESCRIPTION AND REMARKS DESCRIPTION AND REMARKS DI 581.74 -<	
COLLAR ELEV. 584.1 ft TOTAL DEPTH 21.1 ft NORTHING 885,727 EASTING 1,849,506 24 HR. DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014 DRILL METHOD NW Casing w/ Core HAMMER TYPE Auto DRILLER Estep, J. E. START DATE 09/03/14 COMP. DATE 09/03/14 SURFACE WATER DEPTH N/A CORE SIZE NO TOTAL RUN 18.7 ft TOTAL RUN SAMP. STRATA REC. L O DESCRIPTION AND REMARKS DESCRIPTION AND REMARKS 581.74 - <td>N/A</td>	N/A
DRILL RIG/HAMMER EFF./DATE HF00066 CME-550 81% 03/19/2014 DRILL METHOD NW Casing w/ Core HAMMER TYPE Auto DRILLER Estep, J. E. START DATE 09/03/14 COMP. DATE 09/03/14 SURFACE WATER DEPTH N/A CORE SIZE NO TOTAL RUN 18.7 ft DESCRIPTION AND REMARKS DESCRIPTION AND REMARKS <t< td=""><td>N/A</td></t<>	N/A
DRILLER Estep, J. E. START DATE 09/03/14 COMP. DATE 09/03/14 SURFACE WATER DEPTH N/A CORE SIZE NO TOTAL RUN 18.7 ft DEPTH (ft) RUN (ft) DEPTH (ft) RUN (ft) DRILL (ft) RUN (ft) DRILL (ft) RUN (ft) STRATE (ft) SAMP. NO. STRATA REC. (ft) L 0 (ft) DESCRIPTION AND REMARKS 581.74 -	natic
CORE SIZE NO TOTAL RUN 18.7 ft ELEV (ft) DEPTH (ft) DEIL (ft) DRILL (ft) RUN (ft) DRILL (ft) RUN (ft) STRATA (ft) L REC. ODD (ft) DESCRIPTION AND REMARKS 581.74 581.77 2.4 3.7 (3.7) 100% (3.7) 100% (3.7) 100% (3.7) 100% (3.7) 100% (3.7) 100% (3.7) 100% (3.7) 100% 581.7 2.4' - 6.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULTE TO AMPHIBOLITE. 578.0 6.1 0	
ELEV (ft) RUN (ft) DEPTH (ft) RUN (ft) DRILL (ft) RUN RATE (Min/ft) SAMP. (ft) STRATA REC. L 0 G DESCRIPTION AND REMARKS 581.74 - - - - - - - DESCRIPTION AND REMARKS 580 - - - - - - - DESCRIPTION AND REMARKS 580 - - - - - - - - DESCRIPTION AND REMARKS 580 -<	
(ft) ELEV (ft) (ft) (ft) RATE (ft) (ft) RATE (ft) (ft) NO. (ft) NO. (ft) (ft) D 581.74	
581.74 Begin Coring @ 2.4 ft 580 581.7 2.4 3.7 (3.7)	PTH (ft)
580 581.7 2.4 3.7 (3.7) (3.7) (3.7) 581.7 CRYSTALLINE ROCK 580 - - 100% 100% 100% 2.4' - 6.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULTE TO DARK HPHBOLITE. 578.0 6.1 -<	
578.0 6.1 UNFOLIATED GRANULITE TO AMPHIBOLITE.	2.4
	6.1
5.0 (5.0) (5.0) (4.9) (4.9) (4.9) 100% 100% 99% 99% 100% 100% 100% 100% 10	
575 CRYSTALLINE ROCK 6.1' - 11.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE	
573.0 11.1 573.0 GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE 573.0 B1=15 B2=20 B3= 30 B4= 25 B5=4	11.1
570 T 100% 106% 106% T RMR 94, VERY GOOD ROCK, CLASS II, TYPE D	
SER 0 T 16 1 CRYSTALLINE ROCK RS-B1-B-1 See 0 11.1' - 16.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE	46.4
5.0 (5.0) (5.0) (5.2) (5.2) (5.2) GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE R1=15, R2=20, R3= 30, R4= 25, R5=4	10.1
563.0 21.1 CRYSTALLINE ROCK	21.1
Image: Second	
R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE D	
Boring Terminated at Elevation 563.0 ft IN CRYSTALLINE ROCK	

WBS	42841	.1.1			ТІ	Ρ	B-5239		COUNTY	AL/	AMAN	CE			GEOL	OGIST Murray,	C. C.		
SITE	DESCR	IPTION	BRI	DGE	19 0\	٧E	R HAW F	RIVER ON	I HIGHWA	Y 87	BETV	VEEIN S	R 15	30 A	ND SR 1	576		GROUN	D WTR (ft)
BOR	ING NO.	B2-A			S	TA	TION 16	;+29		OFFS	SET ´	13 ft LT			ALIG	NMENT -L-		0 HR.	N/A
COL	LAR ELI	E V . 58	3.2 ft		т	ЭΤ	AL DEPT	H 20.4 ft	t	NOR	THING	885,7	86		EAST	TNG 1,849,468		24 HR.	N/A
DRIL	L RIG/HAI	MMER E	FF./DA	TE HF	-O0066	CN	ME-550 819	% 03/19/20)14			DRILL	IETHO	D N	W Casing	W/SPT & Core	HAMM	ER TYPE	Automatic
DRII	LER E	step, J.	E.		S	TA	RT DATE	09/10/1	4	COM	P. DA	TE 09/*	10/14		SURF	ACE WATER DEF	РТН 0.:	5ft	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	JNT 0.5ft	1	0 2	BLOWS F 5 £	PER FOOT	75	100	SAMP. NO.	мо	L G	ELEV. (ft		CK DESC	CRIPTION	DEPTH (ft)
585	583.2	- 0.0	8	29	27		<u> </u>	· · · · ·	- -• 56				W	000	- 583.2 - 582.3 - 581.2 - 580.1	GROUN ALI 0 - 0.9' ALLUVIU	D SURFA LUVIAL M LOOSE	ACE E WET SILT	0.0 0.9 ГҮ 2.0 3.1
575			60/.1				· · · · · ·			· · · · · · · · · · · · · · · · · · ·	-60/.1 	R <u>S-B2-A</u> R <u>S-B2-A</u>	1 2		<u>576.8</u>	.9-2.0' RESIDUAL W/ ROU WEATH 2.0' - 3.1' WE CRYSTA 2.1' - 6' CPYSTA	SIDUAL V. DENSE CK FRAG ERED RC ATHERE LLINE RO	E SILTY SA SS. DCK D ROCK OCK OCK	ND 6.4
570	-	-					· · · · ·	· · · ·				F <u>S-B2-A</u>	3		<u> </u>	S.1'- 6.4' CRYSTA FROM CRYSTA	1 3.2' - 6. LLINE R	4' 0CK	ED <u>11.4</u>
565		-					· · · · ·			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				- 566.8 -	6.4' - 11.4' CRYSTA 11.4' - 16.4' CRYSTA 16.4' - 20.4'	CORED	ROCK OCK ROCK OCK	16.4
																Boring Terminated CRYSTA	at Elevat	ion 562.8 f	20.4 UN

WBS	42841.1	1.1			TIP	B-523	9	C	OUNT	ΥA		CE		GE	OLOGIS	ST Mur	ray, C	C. C.		
SITE	DESCRIF	TION	BRI	DGE 119	OVEF	R HAV	V RIVER	ON HI	IGHW	'AY 8	7 BETW	EEIN S	R 1530 AN	ID SR	1576				GROUND	WTR (ft)
BOR	NG NO.	B2-A			STAT	ION	16+29			OF	SET 1	3 ft LT		ALI	GNMEN	IT -L-			0 HR.	N/A
COLI	AR ELE	/ . 58	3.2 ft		τοτ	L DE	PTH 20.	4 ft		NO	RTHING	885,7	86	EAS	STING	1,849,4	468		24 HR.	N/A
DRILL	RIG/HAMI	MERE	FF./DA	TE_HFOO	066 CM	E-550	81% 03/19	9/2014				DRILL M	ETHOD NV	N Casir	ng W/SP1	& Core		НАММ	ER TYPE A	utomatic
DRIL	LER Est	ep, J.	E.		STAF	RT DA	TE 09/1	0/14		со	IP. DAT	TE 09/1	0/14	su	RFACE	WATER	DEP	TH 0.8	5ft	
COR	E SIZE N	10			ΤΟΤΑ	L RU	N 17.2 f	t												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	IN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (ft	:)		DESCF	RIPTION	AND RE	MARKS	5		DEPTH (ft)
79.98	580.0	32	2.0		(2.7)	(2.1)								Beg	gin Cori	ng @ 3.	2 ft			
	570 0 T	с.д	3.2		83%	(2.1) 65%					570 0	3.1'-6	6.4' FRESH,	VERY	HARD, N				RACTURED	
75	<u> </u>	0,4	5.0		(4.9)	(2.7)	RS-B2-A-1 RS-B2-A-2	(4.9)	(2.8)		570.0		GRAT AND	F		ROCLAS	TS.		13PAR	6.4
-	Ŧ				99%	ა კ%		90%	30%		-			1 – 15, F R 72, G	00D R0	5- 20, R4 CK, CLA	r ∠0, I SS II, 1 420/42		100 8/05	
	571.8	11.4	E 0		(5.0)	(5.0)		(5.0)	(5.0)		571.8		INT LOAD S		con (con	::::::::::::::::::::::::::::::::::::::	IJUKS	5.8"	199.0KSF	
70	+		5.0		(5.0) 100%	(5.0) 100%	RS-B2-A-3 RS-B2-A-4	(3.0) 100%	100%		-	6.4' - 1	1.4' FRESH,	, VERY	<mark>RYSTAL</mark> HARD, I	LINE RO	TELY	CLOSE I	FRACTURED	,
	566 9 +	16.4					·				566 9	INCLU	DES TRANS	SITION	ZONE FI	ROM GR. ANITE.	AY GF	RANULIT	E TO WHITE	16 4
ô5		10.4	4.0		(4.0)	(4.0)		(4.5)	(4.4)		500.0		R1 RMR	1=15, F R 72, G	R2=13, R 00D R0	3= 20, R4 CK. CLA	I= 20, I SS II. 1	R5=4 TYPE E		10,4
	562.8	20.4			100%	100%		112%	111%		- 562.9	11.4	16 4' EDE	<u>с</u>						
		20.4									502.0	11.4	- 10.4 TRE	PO			NITE.		D, WHITE	20.4
	+										-		RMR 94	4, VER	YGOOD	ROCK, C	LASS	I, TYPE	E	
	Ŧ											POIN	I LOAD STR	C	RYSTAL	LINE RC	201.3K	SF, 12.2	2: 190.3KSF	
	Ŧ											16.4' - 2	20.4' FRESH,	, VERY PO	' HARD, ' RPHYRI	very Wi Tic gra	DELY NITE.	FRACTL	IRED, WHIT	E
	Ŧ										-		R1 RMR 94	1=15, F 4, VER	₹2=20, R Y GOOD	3= 30, R4 ROCK, C	I= 25, I CLASS	R5=4 I, TYPE	E	
	Ŧ											Во	ring Termina	ted at I	Elevation	562.8 ft l	N CRY	STALLI	NE ROCK	
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NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	42841	.1.1			ті	ΡB	-5239		COUNT	ΓΥ Α	LAMAN	CE			GEOLOGIST Murray, C. C.
SITE	DESCR	IPTION	BRI	DGE 1	19 O\	/ER	HAW	RIVER C	N HIGHW	AY 8	7 BETV	VEEIN S	SR 153	30 AN	ND SR 1576 GROUND WTR (ft)
BOR	NG NO.	B2-B			S	TATIO	DN 1	6+34		OF	FSET ?	I0 ft RT			ALIGNMENT -L- 0 HR. N/A
COL	AR ELE	EV . 58	3.9 ft		т	DTAL	DEP	TH 25.2	ft	NO	RTHING	885,7	'96	-	EASTING 1,849,489 24 HR. N/A
DRILI	RIG/HAI	MMER E	FF./DA	LE HE	O0066	CME	550 81	% 03/19/	2014			DRILL	NETHO	DN	W Casing W/SPT & Core HAMMER TYPE Automatic
DRIL	LER E	step, J.	E.		S	TARI	DAT	E 08/27	/14	со	MP. DA	TE 08/	27/14		SURFACE WATER DEPTH 1.0ft
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W COU 0.5ft	JNT 0.5ft	0		BLOWS	50 50	T 75	100	SAMP. NO.	моі	L O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
585	583.9		11	12	18			• 30 ·					w		583.9 GROUND SURFACE 0.0 ALLUVIAL 0 - 5.0' ALLUVIUM, PROBABLY GRAVEL,
580	578.9	5.0	32	68/4							· · ·		w	5977A	578.9 5.0
575	- - -		52	007.4			· · · ·	· · · · ·	· · · · · · · · · · · · · · · · · · ·	· · ·	100/.9				5.0' - 11.6' WEATHERED ROCK, REFUSAL AT BASE
570	- - -						· · · · · · · ·		· · · · ·	· · ·	· · · ·				572.3 11.6 CRYSTALLINE ROCK 11.6' - 15.2' CRYSTALLINE ROCK, CORED 568.7 FROM 11.7' TO 15.2 15.2'
565	-						· · · ·	· · · ·	· · · · ·	· · · · · ·	· · · ·			XIX.	CRYSTALLINE ROCK - 15.2' - 20.2' CORED ROCK
560	- - -	+ + +					· · · ·	· · · · · · · · · · · · · · · · · · ·	. . .	 	· · · ·	F <u>S-B2-B</u> F <u>S-B2-B</u>	- 1 1/2		- CRYSTALLINE ROCK - 20.2' - 25.2' CORED ROCK
ACUOI BORE SINGLE B3238 GEO BH BRUGUT18,GFJ NC_UOI.GUI 10/2/714															Boring Terminated at Elevation 558.7 ft IN CRYSTALLINE ROCK

WBS	42841.1.1			TIP	B-523	39	c	OUNT	Y A		CE	GEOLOGIST Murray,	C. C.		
SITE	DESCRIPTIO	N BR	DGE 119	OVE	R HAV	V RIVER	ON H	IGHW	AY 8	87 BETW	EEIN SR 1530 ANI	D SR 1576		GROUN	ID WTR (ft)
BOR	ING NO. B2-	В		STA	TION	16+34			OF	FSET 1	0 ft RT	ALIGNMENT -L-		0 HR.	N/A
COL	LAR ELEV. 5	83.9 ft		тот	AL DE	PTH 25	.2 ft		NO	RTHING	885,796	EASTING 1,849,489		24 HR.	N/A
DRILI	RIG/HAMMER	EFF./DA	TE HFOO	066 CN	E-550	81% 03/1	9/2014		۰		DRILL METHOD NW	/ Casing W/SPT & Core	HAMM	ER TYPE	Automatic
DRIL	LER Estep,	J. E.		STA	RT DA	TE 08/2	7/14		co	MP. DAT	E 08/27/14	SURFACE WATER DEF	тн 1.	Oft	
COR	E SIZE NO			тот	AL RU	N 13.5 f	t		1			· · ·		•	
ELEV (ft)	RUN ELEV (ft) (ft)	H RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	JN RQD (ft) %	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft) %	L O G	ELEV. (ft	D	DESCRIPTION AND REMARK	s		DEPTH (ft)
572.24					L¥						· · · · · · · · · · · · · · · · · · ·	Begin Coring @ 11.7 ft			
570	572.2 + 11.7	3.5		(3.4) 97%	(3.4) 97%						11.7' - 15.2' FRESH,	CRYSTALLINE ROCK VERY HARD, VERY WIDELY PORPHYRITIC GRANITE.	FRACTI	JRED, W	
	-	5.0		(5.0)	(5.0)		(5.2)	(5.2)	52	-	R1: RMR 94, VER	=15, R2=20, R3= 30, R4= 25, Y GOOD ROCK, CLASS I, TY	R5=4 PE E <i>(c</i> o	ntinued)	<u> </u>
565	563.7 20.2			100%	100 %		104 70	104 78		- 563.7	15.2' - 20.2' FRESH,	CRYSTALLINE ROCK VERY HARD, VERY WIDELY PORPHYRITIC GRANITE.	FRACTI	JRED, W	
	Ţ	5.0		(5.0) 100%	(5.0) 100%		(5.3) 106%	(5.3) 106%		-	R1: RMR 94	=15, R2=20, R3= 30, R4= 25, VERY GOOD ROCK, CLASS	R5=4	E	
560	558.7 _ 25.2					RS-B2-B-1 RS-B2-B-2				558.7	20.2' - 25.2' FRESH,	CRYSTALLINE ROCK VERY HARD, VERY WIDELY	FRACTU	JRED, WH) ∜ITE <u>_25.2</u>
	ļ <u>†</u>									-	R1:	=15, R2=20, R3= 30, R4= 25,	R5=4	F	
										-	POINT LOAD ST	RENGTH INDEX: 22.5' : 237	(SF, 22.)	8': 205KSF	
										-	Boring Terminate	ed at Elevation 558.7 ft IN CR	YSTALLI	NE ROCK	
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WBS	42841	.1.1			ТІ	P B-5239		COUNT	Y ALAM	ANCE			GEOLOGIST Murray, C. C.
SITE	DESCR	IPTION	BRI	DGE ′	19 OV	ER HAW	RIVER ON	HIGHW	AY 87 BE	IWEEIN	SR 153	0 AN	D SR 1576 GROUND WTR (ft)
BOR	NG NO.	B3-A			ST	ATION 17	7+07		OFFSET	24 ft L	Г		ALIGNMENT -L- 0 HR. N/A
COLI		EV. 59	90.9 ft		тс	TAL DEPT	H 49.1 ft		NORTHI	IG 885	,859		EASTING 1,849,439 24 HR. 5.0
DRILL	RIG/HA	MMER E	FF./DA	TE H	O0066	CME-550 81	% 03/19/20	14		DRILL	METHO	D NV	V Casing W/SPT & Core HAMMER TYPE Automatic
DRIL	LER E	step, J.	E.		ST	ART DATE	09/16/1	4	COMP. D	ATE 09	9/16/14		SURFACE WATER DEPTH N/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	JNT 0.5ft	0 2	BLOWS F	PER FOOT	75 10	SAMF	Р. МОІ	L O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
595							1					-	590.9 GROUND SURFACE 0.
585		- - - 4.1	20	32	19		· · · · ·	51	· · · · · · · · · · · · · · · · · · ·		M		0 - 4' ALLUVIAL, LIGHT TAN, DRY SOFT NON PLASTIC SAND. CONSTITUENCY OF 586.9 BEACH SAND 4.0 ARTIFICIAL FILL 4', 8' EMBANKMENT, CRUSHED STONE
580		- - - <u>9.1</u> -	100/.4	-			· · · · ·	· · · · ·		4	w		582.9 8 CHARNENT, GROUTED STORE. 582.9 8.0 RESIDUAL 8' - 12.4' RESIDUAL, RED ORANGE, MOIST, DENSE TO VERY DENSE, NON
575	577.2	13.7	18	31	30			· · · · · · · · · · · · · · · · · · ·			w		578.5 PLASTIC, CLAYEY COARSE SAND W/ 12.4 577.2 SEV. WEATH. CRYSTALLINE ROCK SEAM 13.7 575.5 CRYSTALLINE ROCK 15.4 575.5 CRYSTALLINE ROCK 15.4
570	-							· · · · · ·		-		000000000000000000000000000000000000000	12.4 - 13.7 RESIDUAL BOULDER. RESIDUAL 13.7' - 15.4' RESIDUAL, RED ORANGE, MOIST, VERY DENSE NON PLASTIC COARSE CLAYEY SAND CRYSTALLINE ROCK 4.1 - 41 - 40.7' CORED ROCK
565		25.7	20	35	52			· · · · ·		 R <u>S-B3-</u>	A/1 W		567.2 15.4' - 18.7' CORED ROCK 23.1 665.2 18.7' - 23.7 CORED WITH VERY POOR 25.1 RECOVERY, PROBABLY RESIDUAL SOIL CRYSTALLINE ROCK
560	-	+ + + +)				· · · ·	-1			562.2 23.7' - 25.7' CORED ROCK 28. RESIDUAL - 25.7' - 28.7 RESIDUAL, DARK GRAY, WET, NON PLASTIC GRAVEL, PROBABLY
555	-												557.2 WEATHERED MARK DIRE. 33. CRYSTALLINE ROCK 28.7' - 33.7' CORED ROCK CRYSTALLINE ROCK 33.7' - 38.7' CORED ROCK
550	-												552.2 38. CRYSTALLINE ROCK 38.7' - 43.7 CORED ROCK
545	-	+											547.2 43. CRYSTALLINE ROCK 43.7' - 49.1' CORED ROCK
ארב אואפרב הלגאים מרע מו האיניטיטי אייילייייני							<u> : : : :</u>	<u> : : : :</u>					541.8 49. Boring Terminated at Elevation 541.8 ft IN CRYSTALLINE ROCK
													_

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WBS	42841	.1.1			TIP	B-523	9	C	OUNT	Ύ́	ALAMANC	E	GEOLOGIST Murray, C	C. C.	r	
SITE	DESCR	IPTION	BRI	DGE 119	OVE	RHAV	V RIVER	ON H	IGHW	AY 8	87 BETWE	EEIN SR 1530 ANE	O SR 1576		GROUND	VTR (ft)
BOR	NG NO.	B3-A			STAT	LION	17+07			OF	FSET 24	ft LT	ALIGNMENT -L-		0 HR.	N/A
COLI	AR ELE	E V . 59	0.9 ft		тот	AL DE	PTH 49	1 ft		NC	DRTHING	885,859	EASTING 1,849,439		24 HR.	5.0
DRILL	. RIG/HAI	MMER E	FF./DA	TE HFOO	066 CM	E-550	81% 03/1	9/2014			[[DRILL METHOD NW	Casing W/SPT & Core	HAMM	ER TYPE Au	tomatic
DRIL	LER E	step, J.	E.		STAF	RT DA	TE 09/1	6/14		CC	MP. DATE	09/16/14	SURFACE WATER DEP	TH N/	A	
COR	E SIZE	NO			TOT	AL RU	N 36.7 f	t			,	· · · · · · · · · · · · · · · · · · ·				
ELEV (ft)	RUN ELEV _(ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)	D	ESCRIPTION AND REMARKS	S		DEPT <u>H (ft)</u>
78.47	E 70 E	121							[Begin Coring @ 12.4 ft			
	577.2	13.7	1.3	N=61	(0.2) 15%	(0.0)				<u>N</u>	577.2		RESIDUAL			12.4
575		- 15.4 - -	3.3		(0.0)	(0.0)		(2.9) 89%	(2.9) 89%	P	- 575.5	15.4' - 18.7' FRESH	CRYSTALLINE ROCK	RACTUR	ed, white	15.4
	572.2	18.7	5.0		88%	(2.9)		(0.4)	(0.0)	000	572.2	R1=	PORPHYRITIC GRANITE. 15, R2=17, R3= 20, R4= 20,	R5=4		18.7
570	-	-	0.0		(0.3) 6%	(0.0) 0%		7%	0%		<u>}</u> \	RMR 7	76, GOOD ROCK, CLASS II,	TYPE E		
	567.2	23.7									567.2	18.7' - 23.7'	: 6" RECOVERED OF GRAY	GRANU	LITE	23.7
565			5.0		(1.6) 32%	(1.6) 32%	RS-B3-A-1	(1.6) 81%	(1.6) 80%		565.2	23.7' - 25.7' VERY HA	CRYSTALLINE ROCK ARD, FRESH, DARK GRAY, C	LOSELY	FRACTURE)25.7
		-		N=87						000		R1=	FINE GRAINED GRANULITE 15, R2=17, R3= 10, R4= 12,	R5=4		
	562.2	28.7	5.0		(2.8)	(1.6)	ĺ	(2.9)	(1.6)		562.2	RMR POINT LOAD STR	58, FAIR ROCK, CLASS III, T ENGTH INDEX: 24' : 208.9KS	'YPE D SF, 24.4'	: 263.1KSF	28.7
560	_	_			56%	32%		57%	32%		- ľ		RESIDUAL]
	557.2	33.7									557.2	28.7' - 33.7' VERY HA	ARD, FRESH, DARK GRAY, C	LOSELY	FRACTURE) 33.7
555	-	-	5.0		(4.2) 84%	(1.1) 22%		(4.3) 85%	21%			R1=	=15, R2=8, R3= 10, R4= 20, I	R5=4		1
	-					ł			ĺ			RMR	CRYSTALLINE ROCK	TPED]
	552.2	38.7	5.0		(5.0)	(5.0)		(5.0)	(5.0)		552.2	33.7' - 38.7' TRANSIT AT TOP TO TO FRES	TION FROM MODERATELY S SH AT BASE. DARK GRAY, C	EVERE	WEATHERED) <u>38.7</u>
550	-	-			100%	100%		101%	100%			R	FINE GRAINED GRANULITE 1=7, R2=8, R3= 10, R4= 6, R	5=4		1
	547.2	43.7	5.4		(5.0)	(5.0)		(5.1)	(5.1)		547.2	RMR 3	35, POOR ROCK, CLASS IV, CRYSTALLINE ROCK	TYPE D		43.7
545	-		5.4		93%	93%		95%	94%			38.7' - 43.7' VERY H	ARD, FRESH, DARK GRAY, \ FINE GRAINED GRANULITE 15, R2=20, R3= 30, R4= 25, VERY GOOD BOCK CLASS	MDELY R5=4	FRACTURED	
		<u>49.1</u>								1.1	<u>541.8</u>		CRYSTALLINE ROCK			<u>49.1</u>
		-										43.7 - 49.1 VERT H	FINE GRAINED GRANULITE		FRACIURED	
	-	-				1					F {	R1= 	15, R2=20, R3= 30, R4= 25, VERY GOOD ROCK, CLASS	R5=4 I, TYPE	D	
	-	È.										Boring Terminate	d at Elevation 541.8 ft IN CR	STALLI	NE ROCK	
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WBS	42841	.1.1			TI	P B-5239	COUNTY	ALAMAN	GEOLOGIST Murray, C. C.																				
SITE	DESCR	IPTION	BRI	DGE 1	19 0\	VER HAW RIVER ON	HIGHWAY	Y 87 BETW	EEIN S	R 1530) AN	O SR 1576 GROUND WTR (ft)																	
BOR	ING NO.	B3-B			s	TATION 17+09	C	OFFSET 2	6 ft RT			ALIGNMENT -L-	0 HR.	N/A															
COL	LAR ELI	E V . 59	2.0 ft		т	OTAL DEPTH 38.9 f	t N	ORTHING	885,8	72		EASTING 1,849,487	24 HR.	7.0															
DRILI	RIG/HA	MMER E	FF./DA	TE H	00066	CME-550 81% 03/19/20)14		DRILL N	ETHOD	N٧	V Casing W/SPT & Core HAMN	IER TYPE	Automatic															
DRIL	LER E	step, J.	E.		S	TART DATE 09/11/1	4 C	COMP. DAT	E 09/	11/14		SURFACE WATER DEPTH N	/A																
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	JNT 0.5ft	BLOWS 0 25	PER FOOT	5 100	SAMP. NO.	моі	L O G	SOIL AND ROCK DES	DEPTH (ft)																
595		-				\	· · · · ·					- 592.0 GROUND SURF ALLUVIAL 0 - 4 8 ALLUVIAL TAN DRY	0.0 TO																
585	587.2	4.8	60/.1									0 - 4.8 ALLUVIAL TAN DRY, V. LOOSE TO LOOSE NON PLASTIC SAND. CONSTITUENCY OF BEACH SAND. CRYSTALLINE ROCK 4.8' - 8.7 RESIDUAL BOULDER. LIMITS UNCERTAIN																	
580	582.3	9.7	18	38	50			· · · · · · · · · · · · · · · · · · ·		w		RESIDUAL 8.7' - 14.1 RESIDUAL, G HARD, WEATHERED DIA 577.9	REEN, WET ABASE DIKE																
575	573.2	- 18.8_	60/.1 49	34		15	15	15	15	15	15	15	15	15	15	15	15			· · · · · · · · · · · · · · · · · · ·		× • • • • •		CRYSTALLINE R 576.0 14.1' - 16' CRYSTALLINE R - RECOVERY RESIDUAL 16' - 22.5' DARK GRAY, M	CRYSTALLINE ROCK 14.1' - 16' CRYSTALLINE ROCK, NO CORE RECOVERY. RESIDUAL 16' - 22.5' DARK GRAY, MOIST, CLAYEY SANDY GRAVEL TRANSITION EPOM				
570	569.3	22.7	60/.1									SANDY GRAVEL. TRANS RESIDUAL SOIL TC <u>569.5</u> <u>CRYSTALLINE R</u> 22.5' - 23.3' CRYSTALLIN REFLISAL AT TOP ROL	OCK E ROCK E ROCK SP	M 22.5 23.3 T25.7															
565 560								· · · · ·	<u>S-B3-B</u> S-B3-B			CREFUSAL AT B/ CRYSTALLINE R 563.1 23.3' - 25.7' COREE CRYSTALLINE R 25.7' - 28.9' COREE - CRYSTALLINE R	OCK OCK OCK OCK OCK	28.9															
555		- - - - -										558.1 28.9' - 33.9' CORED CRYSTALLINE R 33.9' - 38.9' CORED - 553.1	ROCK	33.9															
												Boring Terminated at Eleva CRYSTALLINE R	tion 553.1 ft OCK	IN															

\sim																							
WBS	42841	.1.1			TIP	B-523	9	C	OUNT	γA	AMANCE		GEOLOGIST Murray, C. C.										
SITE	DESCR	PTION	BRI	DGE 119	OVE	R HAV	V RIVER	ON HI	IGHW	AY 8	BETWEEIN SR	1530 ANI	D SR 1576	GROUND	NTR (ft)								
BORI	NG NO.	B3-B			STA	TION	17+09			OF	SET 26 ft RT		ALIGNMENT -L-	0 HR.	N/A								
COLI	AR ELE	V . 59	2.0 ft		тоти	AL DE	PTH 38	.9 ft		NC	THING 885,872		EASTING 1,849,487	24 HR.	7.0								
DRILL	RIG/HAN	IMER E	FF./DA	TE HFOO	066 CN	IE-550	81% 03/1	9/2014			DRILL MET	HOD NW	Casing W/SPT & Core	HAMME	ER TYPE AU	Itomatic							
DRIL	LER Es	step, J.	E.		STAR	RT DA	TE 09/1	1/14		cc	P. DATE 09/11/	'14	SURFACE WATER DEP	TH N//	A								
COR	E SIZE	NO			тоти	AL RU	N 33.8 f	t															
ELEV	RUN FLEV	DEPTH	RUN	DRILL RATE	REC.	JN RQD	SAMP.	SAMP. REC. RQD					ESCRIPTION AND REMARK	S									
(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	Ğ	ELEV. (ft)		DEPTH (ft)										
86.91	586.0	-51			(0.6)	(0.0)							Begin Coring @ 5.1 ft RYSTALLINE ROCK (continued)										
585	586.3_7	t_ <u>5</u> .7_/	13.1		(0.5)	(0.6) 100%						L	RTSTALLINE RUCK (CONTINUED)										
	-	-			(0.6) 4%	(0.0) 0%					583.3		RESIDITAL			8.7							
500	-	-		N=88									REODORE										
580	-	-																					
	-	-		N-CO(4							577.9		CRYSTALLINE ROCK			14.1							
575	-	-		IV=60/.1						000	576.0		RESIDUAL			16.0							
	573.2	- 18.8								000													
	1	-	5.1	N=49	(0.7) 13%	(0.0) 0%				000													
570	-	-									569.5					22.5							
	568.1	23.9	1.8	N=60/.1	(1.3)	(1.2)		(1.1)	(1.1)		568.7		CRYSTALLINE ROCK										
565	566.3	25.7	3.2		72%	67%		48%	48%		<u>566.3</u> 23.3' - 25.	7' VERY HA	RD, FRESH, DARK GRAY, C		FRACTURED	25.7							
303	563 1				(3.1) 97%	(3.1) 97%		102%	93%		562.1	R1	=15, R2=8, R3= 20, R4= 20,	R5=4		28.0							
		- 20.0	5.0		(5.0)	(5.0)		(5.1)	(5.1)		<u></u>	RIVIR	CRYSTALLINE ROCK	TYPED									
560	1	-			100%	100%	RS-B3-B-1	103%	103%		25.7' - 28	.9' VERY H	ARD, FRESH, DARK GRAY, I FINE GRAINED GRANULITE	WIDELY F	RACTURED,								
	558.1	33.9					<u>қ S-вз-в-</u> ұ				558.1	R1= RMR 84	15, R2=20, R3= 25, R4= 20, VERY GOOD ROCK, CLASS	R5=4	п	33.9							
	1	-	5.0		(5.0)	(5.0) 100%		(5.2) 104%	(5.2) 104%		<u> </u>		CRYSTALLINE ROCK	<u>, , , , , , , , , , , , , , , , , , , </u>									
555	-	-									28.9' - 33	.9' VERY H	ARD, FRESH, DARK GRAY, FINE GRAINED GRANULITE	WIDELY I E.	FRACTURED								
	553.1	38,9								7-2	553.1	R1= RMR 94.	15, R2=20, R3= 30, R4= 25, VERY GOOD ROCK, CLASS	R5=4 S I. TYPE	D	38.9							
	-	-									POIN	LOAD ST	RENGTH INDEX: 30.6' : 274k	(SF, 30.9	: 300KSF								
		-									33.9' - 38.	9' VERY HA	RD, FRESH, DARK GRAY, C		FRACTURED								
	+	-										R1=	15, R2=20, R3= 30, R4= 25,	=. R5=4									
	+	-									Borin	RMR 94, Terminate	VERY GOOD ROCK, CLASS d at Elevation 553.1 ft IN CR	SI, TYPE									
	+	-																					
	+	-																					
	+	-																					
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WBS 42841.1.1 TIP B-5239 COUN							COUNT	Y ALAMAN	CE			GEOLOGIST Murray, C. C.				3 4284 ⁻	1.1.1			TIP	B-5239	COUNTY			
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWA							87 BETWEE	EIN SR	1530 A	ND S	R 1576 GROUND WTR (ft)			SITE DESCRIPTION BRIDGE 119						VER HAW RIVER ON HIGHW					
BORING NO. EB2-A STATION 17+83						OFFSET	10 ft LT			ALIGNMENT -L-	ALIGNMENT -L- 0 HR. 19.0			ING NO.	EB2-	В	ST	STATION 17+82							
COLLAR ELEV. 608.4 ft TOTAL DEPTH 31.9 ft						NORTHING 885,936				EASTING 1,849,435	EASTING 1,849,435 24 HR. 12.0			LAR EL	EV. 60)8.3 ft	то	TOTAL DEPTH 33.1 ft							
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014							•	DRILL	METHO	D N	WW Casing w/ SPT	Casing w/ SPT HAMMER TYPE Automatic			DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014										
DRILLER Estep, J. E. START DATE 08/26/14						COMP. DA	TE 08/	/26/14		SURFACE WATER DEPT	SURFACE WATER DEPTH N/A			LER E	step, J.	E.	ST	START DATE 08/21/14							
ELEV	, DRIVE	DEPTH	BLO	W CO	JNT		BLOWS	PER FOO						CRIPTION	ELEV	DRIVE FL FV	DEPTH	BLC	ow cor	JNT	BLOWS PER FOO				
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имо	I G	ELEV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	5	0	
6000 595 590 585 580 580 580 580 580 580 580 580 58	, DRIVE ELEV (ft) 	DEPTH (ft)	BLC 0.5ft 2 2 2 45 31	W COU 0.5ft 2 2 2 55/.4 69/.5	JNT 0.5ft 2 4 3 8		BLOWS	PER FOO 50	75 100	SAMP NO.			SOIL AND ROC ELEV. (ft) 608.4 GROUND ROADWAY E 0 - 15 RED CLAY WI EMBANKMENT. MC PLASTIC, SLIGHTL 15' - 20.3' GRAY, M PLASTIC, SILTY SA 588.1 WEATHE 20.3' - 31.8' WEATH AND WHITE, HIG GRANITE WITH SU CRYS 576.6 576.6 576.6 576.6 576.6 CRYSTAL 31.8' - 31.9' CRY ROLLER CC Boring Terminate REFUSAL at Ele CRYSTAL	UVIAL MOIST, S J.Y GRA UVIAL MOIST, S J.Y GRA MITH STALS J.Y GRA J.Y	CRIPTION DEPTH (ft) ACE 0.0 KMENT AVEL; MAY BE OFT, HIGHLY VELLY CLAY. 15.0 LOOSE, NON D ALLUVIUM. 20.3 OCK FROCK. PINK, EATHERED IG FELDSPAR 31.8 OCK INE ROCK, FUSAL 1 TRI-CONE 576.5 ft ON OCK	ELEV (ft) 605 600 595 590 585 580	DRIVE ELEV (ft) 	DEPTH (ft) 2.8 2.8 7.8 7.8 7.8 7 7 7 7 7 7 7 7 7 7 7 7 7	BLC 0.5ft 2 2 2 2 2 2 2 45 100/.3	W COU 0.5ft 1 2 9 49 55/.4	JNT 0.5ft 2 3 4 6 51/.3		BLOWS F 5	ER FOOT	
NCDOT BORE DOUBLE B5239		+++++++++++++++++++++++++++++++++++++++															-								





























