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4400B

REFERENCE

SHEET NO.	DESCRIPTION
	TITLE SHEET
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2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-7	CROSS SECTIONS
8-30	ORIG.INVENTORY W/
	BORE LOGS & CORE REPORTS
31-32	TEST RESULTS

#### STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY \_\_\_\_HENDERSON

I-26 FROM US 64 (EXIT 49) PROJECT DESCRIPTION TO US 25 BUSINESS (EXIT 44)

BRIDGE 440212, 1-26 OVER SITE DESCRIPTION CLEAR CREEK

NOTE: UPDATED INVENTORY UTILIZING SUBSURFACE INFORMATION COMPLETED NOV/2001 BY TRIGON ENGINEERING CONSULTANTS

# N 3423 PROJEC

STATE	STATE PROJECT	SHEET NO.	TOTAL SHEETS			
N.C.	I=4400B	34232	1	32		

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

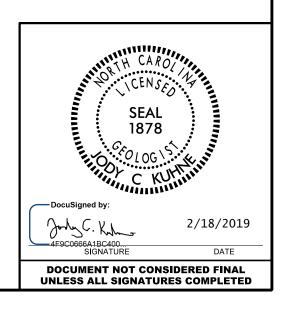
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#### PERSONNEL

	NYLE HOTHEM, TRIGON
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INVESTIGATED	BYNYLE_HOTHEM, TRIGON

SUBMITTED BY \_\_\_\_\_JC\_KUHNE, NCDOT

FEB/ 2019 DATE



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

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed F	Rock Mass (Marı	nos and Hoek,2	2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for T
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marınos, 2000) From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.	VERY GOOD Very rough, fresh unweathered surfaces	<b>COOD</b> Rough, slightly weathered, iron stained surfaces	<b>FAIR</b> Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	<b>VERY POOR</b> Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000) From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fai poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.
STRUCTURE	DEC	REASING SU	JRFACE QUA			COMPOSITION AND STRUCTURE
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70 <sup>0</sup> 60				B. Sand- stone with thin inter- layers of unsimilar billstone in similar stone layers
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		5	0 40			sultstone amounts
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly inter- locked, heavily broken rock mass				30		C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces				20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A			10	Mans deformation after tectonic disturbance

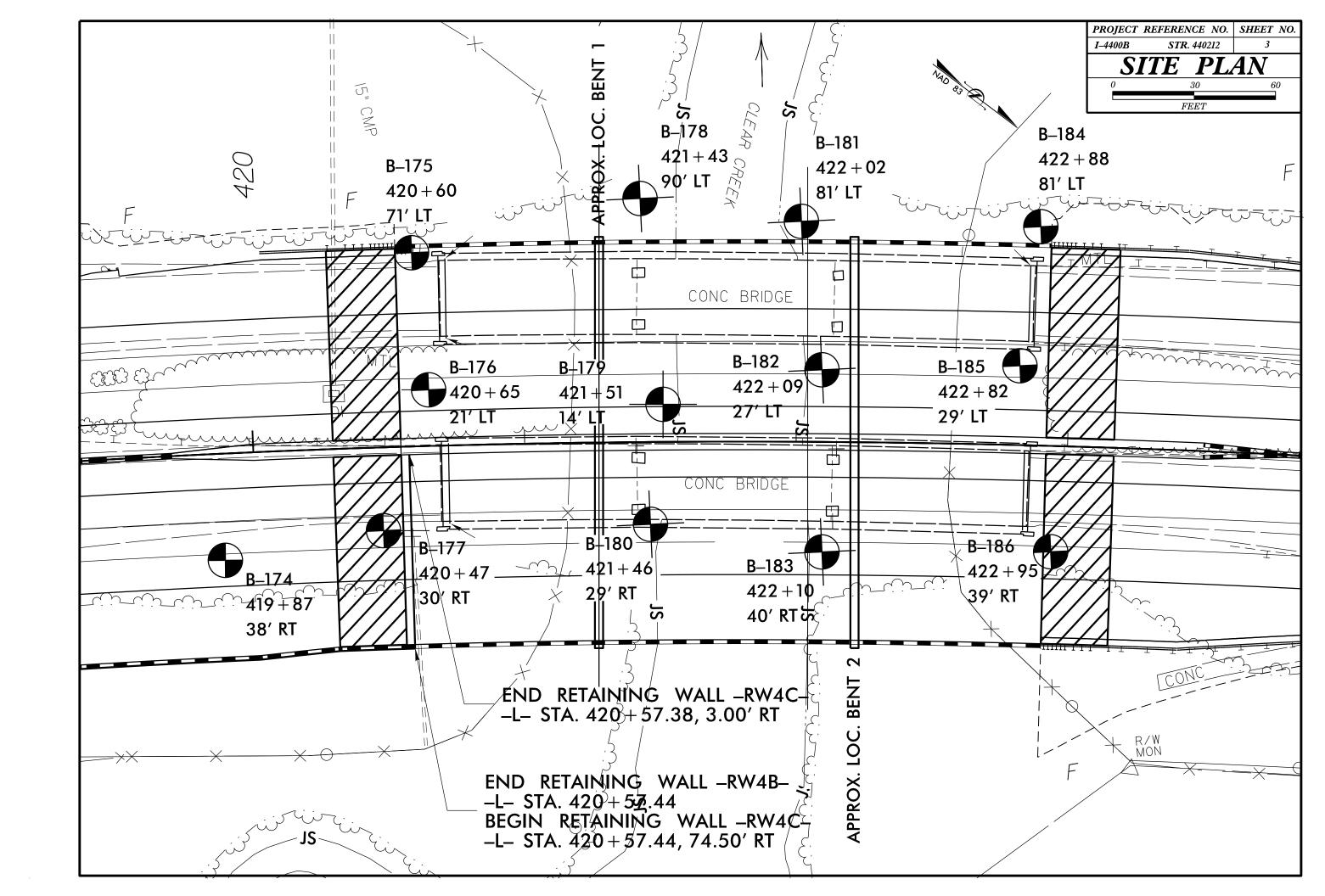
Fectonically Defo	nrmed Heteroc	neneous Rock	Masses (Marij	nos and Hoek	. 2000)
bollo modrig bollo					, 2000,
ی ت ت ق SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)	VERY GOOD - Very Rough, fresh unweathered surfaces	<b>GOOD -</b> Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	Very smooth, occasionally sided surfaces with compact gs or fillings with angular nts	<b>VERY POOR -</b> Very smooth, slicken- sided or highly weathered surfaces with soft clay coatings or fillings
SURFACE C DISCONTINU (Predomina	VERY GOOD unweather	<b>GOOD -</b> Rc surfaces	<b>FAIR -</b> Sm weathered	POOR - Very slickensided coatings or f fragments	<b>VERY POOR</b> sided or h with soft
	70 60	A			
E. Weak siltstone or clayey shale with sandstone layers		50 B 40	СС	D E	
formed, 1/faulted, ale or sultstone deformed forming an ructure			30	F 20	
formed silty forming a with packets ars of ansformed neces.			¢	ŀ	+ <sup>10</sup>

PROJECT REFERENCE NO.

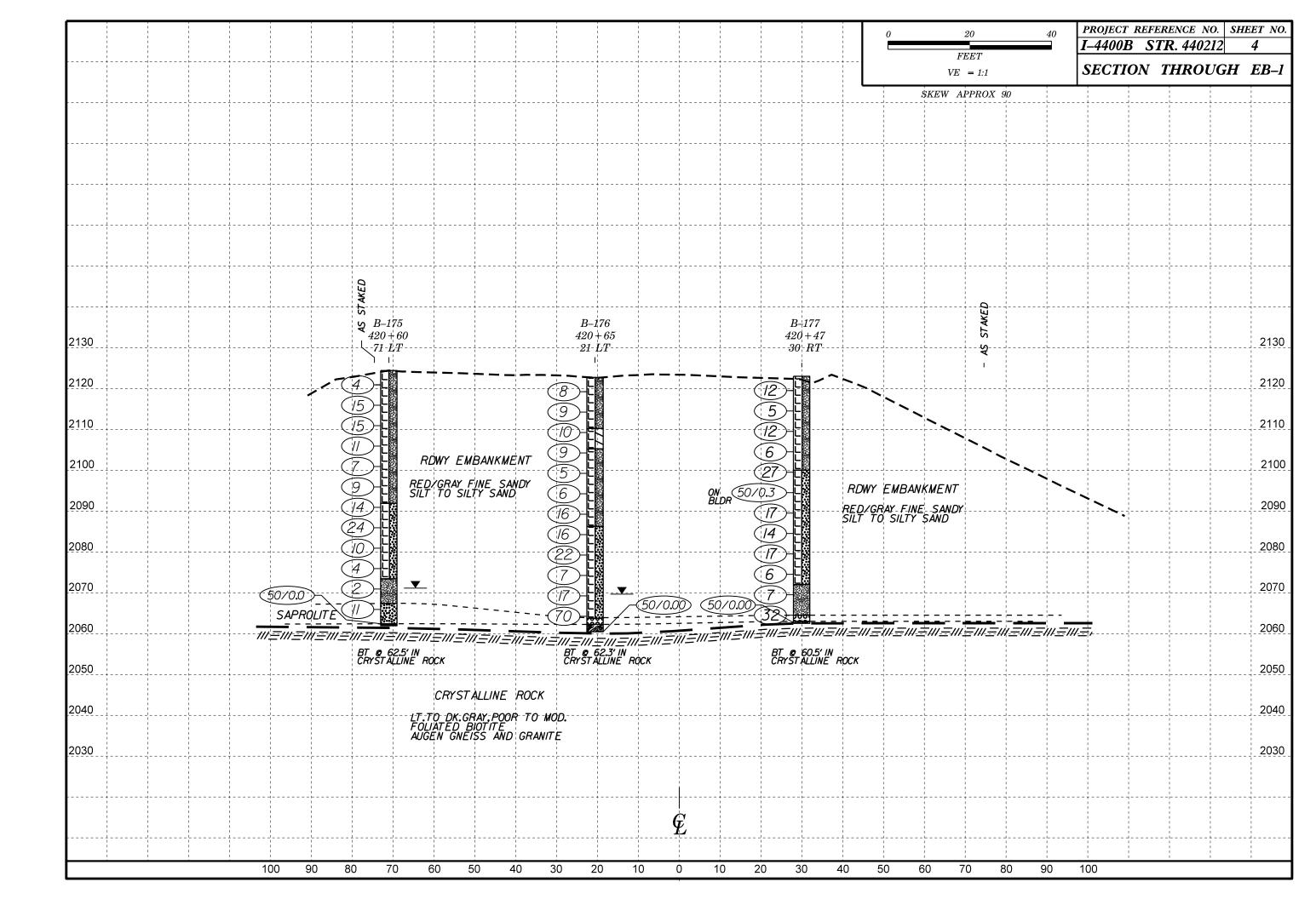
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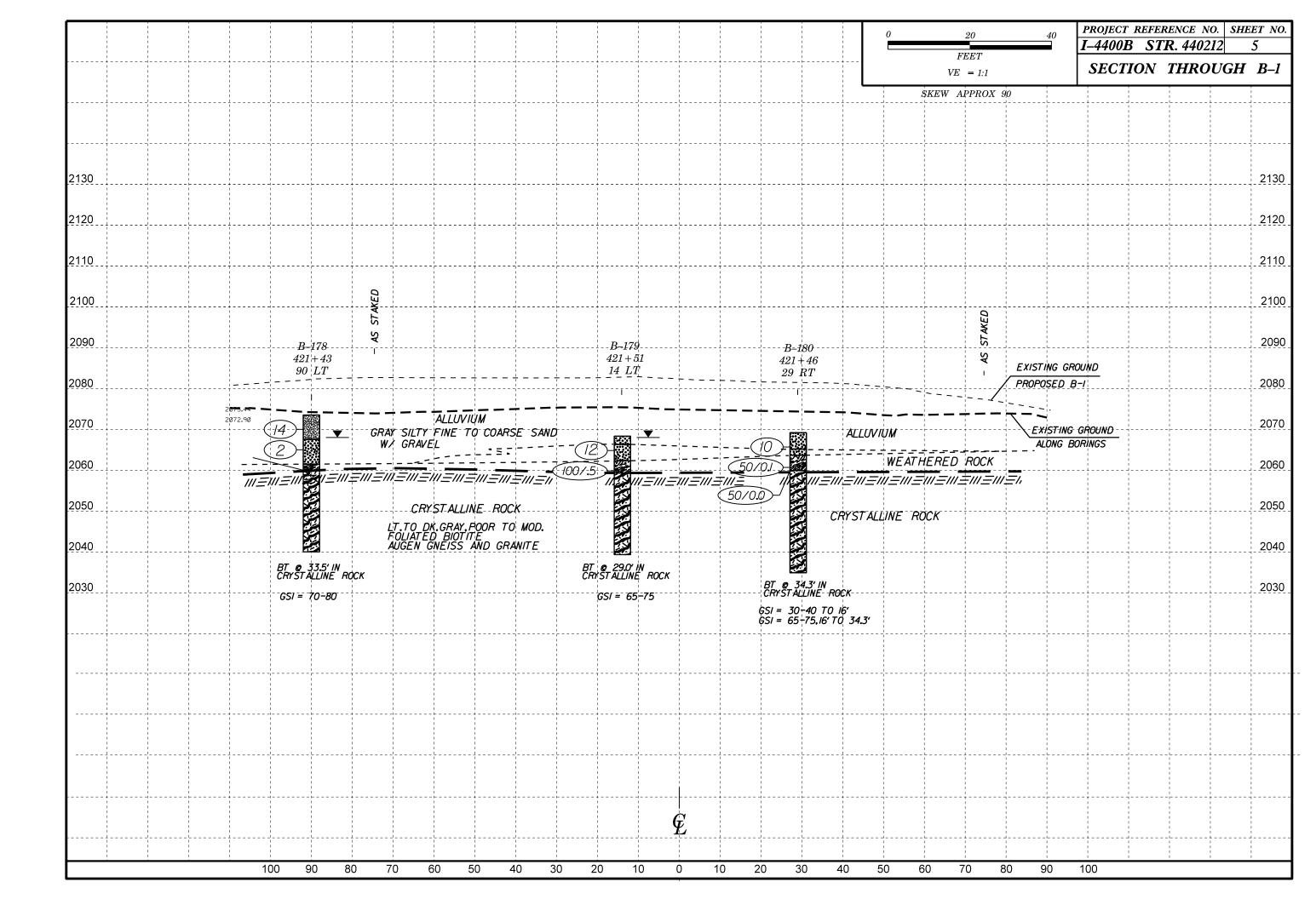
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2A

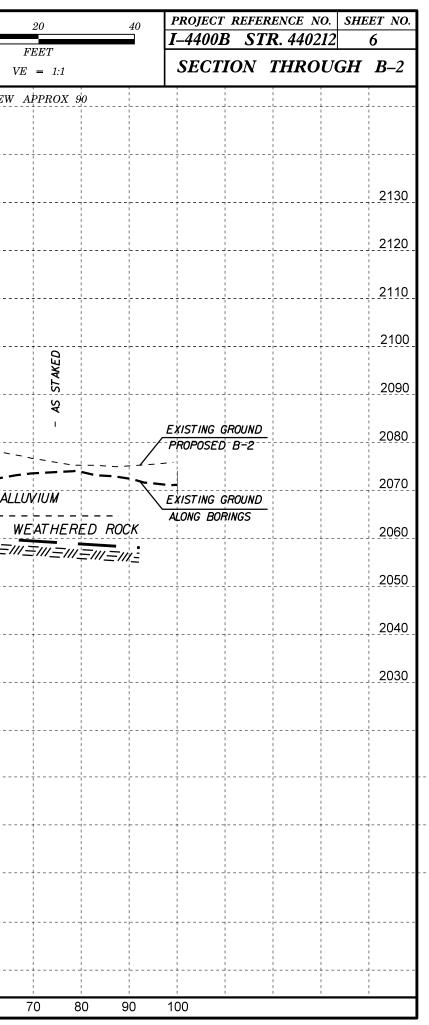


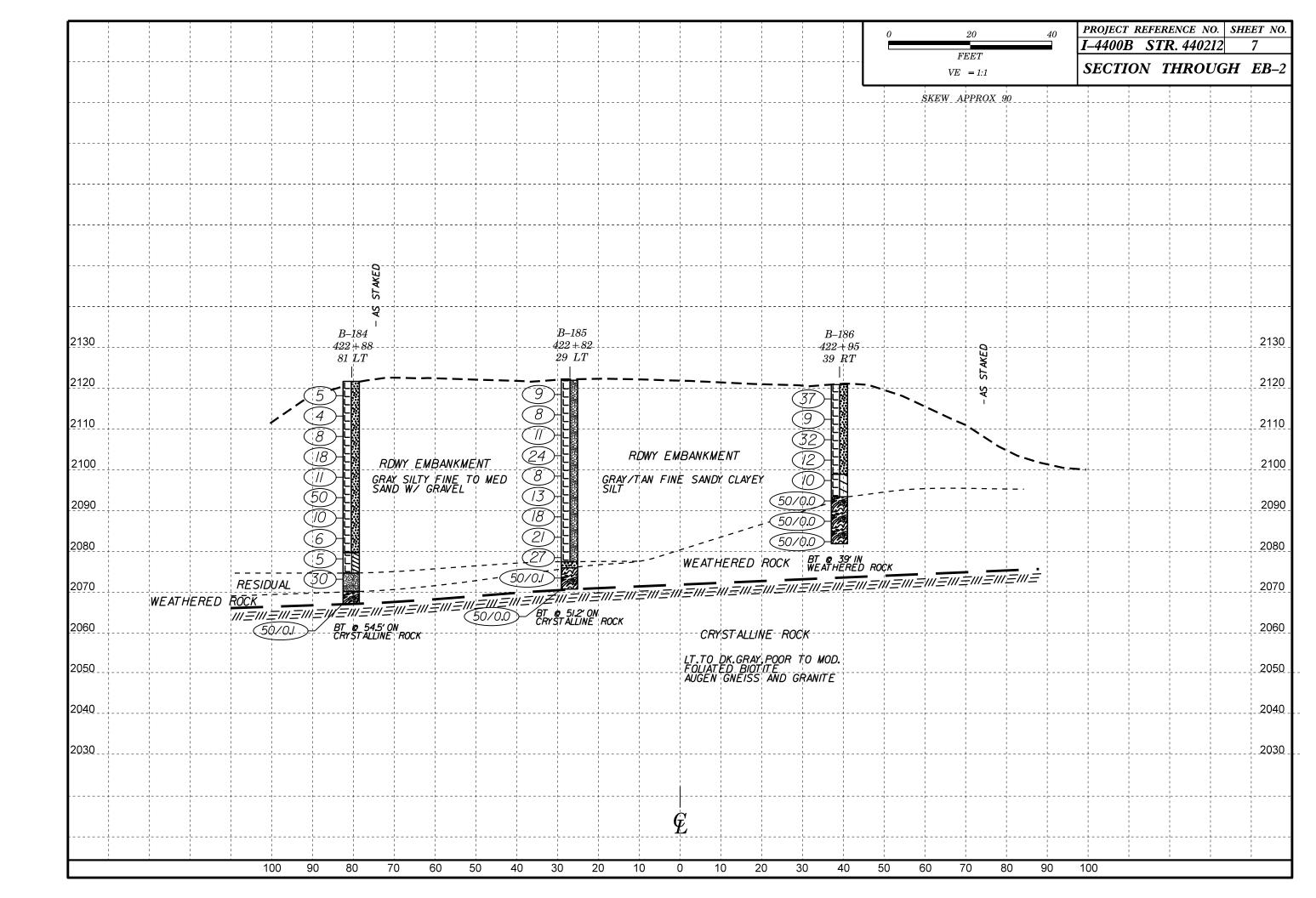
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2130	 										
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2060	 			¥IIIIII	/// <i>Ξ</i> /// <i>Ξ</i> ///		=======================================			<u></u>	=///_///_/
2050	 <u>(50</u>	1/0.0			·		CRYS	TALLINE ROCK			
2040	 				BT	<b>0</b> 286' /N	LT.TO DK. FOLIATED AUGEN-GN	GRAY, POOR TO MC BIOTITE EISS-AND-GRANIT		33.0' IN ALLINE ROC	~~
2030	 		8.2' IN LINE ROCK		CR (	<b>@</b> 28.6' IN YSTALLINE RO SI = 75-85	оск		GSI	ALLINE RUC = 70-80	
					·						             
							E E				
			·								
	100	90 80	70 6	50 50	40 3	30 20	10 0	10 20	30 4	40 50	60





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- 2. SITE LOCATION PLAN (DRAWING 1)
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- 4. FINAL BORING LOGS WITH CORE BORING REPORTS AND ROCK CORE PHOTOS
- 5. AASHTO/ASTM SOIL TEST RESULTS
- 6. SUMMARY OF ROCK TEST DATA
- 7. SITE PHOTOGRAPHS

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL UNIT

# STRUCTURE SUBSURFACE INVESTIGATION

 STATE
 PROJECT
 8.1952001
 I.D. NO. I-4400

 F.A.
 PROJECT
 NHF-26 -1- (62)2 3

 COUNTY
 HENDERSON

 PROJECT
 DESCRIPTION

 I-26
 FR OM NC 225

 (US 225 CONNECTOR) TO NC 280 IN HENDERSON AND

BUNCOMBE COUNTIES

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SITE DESCRIPTION DUAL STRUCTURES ON 1-26 OVER
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CLEAR CREEK

DRAWN BY: D.TEAGUE

STATE	STATE P	ROJECT REFERENCE NO.	SHEET	SHEET TOTAL					
N.C.			1	8					
STATE P	ROJ. NO.	F. A. PROJ. NO.	DESCRIP	TION					
1.95	2001	Her -26-1-(62)23	P.E						
			CONST.						

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SOL AND ROCK BOUNDARES WITHIN A BOREHOLE ARE BASED ON GEDTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE, INTERPRETED BOUNDARES MAY NOT INECESSARLY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, MD BOREHOLE INFORMATION MAY NOT INECESSARLY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. THE LABORATORY SAMPLE DATA AND THE IN STU UN-PLACE) TEST DATA CAN BE RELED ON ONLY TO THE DEGREE OF RELIABLITY INFORMET IN THE STANDARD TEST METHOD. THE DESCRIPTORY DATER LEVELS OR SOL MOSTURE CONDITIONS INCIDENT IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TAKE OF THE INVESTIGATION. THESS WATER LEVELS OR SOL MOSTURE CONDITIONS MAY VARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WHO, AS WELL AS DIFER NON-CLIMATIC FACTORS.

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- NOTE BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAVES ANY CLAMIS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

INVESTIGATED <u>BY TRIGON</u> PER CHECKED <u>BY C.V.NORVILLE</u> SUBMITTED <u>BY N.L. HOTHEM</u> DATE <u>2/01</u>	SONNEL D.TEAGUE W.WHICHARD B. DUCLOS
- 22 <u>2222222222</u>	
SEAL 025257 Z-Z Z - 01 L. HOTTING	

#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

#### DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION						
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T256, ASTM D-1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	<u>WELL GRADED-</u> INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL AN INFI ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN &LFOOT PER 6 IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLOWS:						
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR,							
VERY STIFF, GRW SILTY CLW, WORST WITH INTERGEDDED FINE SMID LIVERS, HIGHLY PLASTIC, A7-6	SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 T						
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERAL OGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT						
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤35% PASSING *200) (>35% PASSING *200)	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.						
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLO SPT REFUSAL IF TESTED. R						
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIE						
SYMBOL DOGGOCOCC	HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENT						
* 10 50 MX GRANULAR SILT-		WEATHERING						
* 40 30 MX50 MX51 MN SOILS SOILS SOILS PEAT	ONGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UND						
• 200 15 MX 25 MX10 MX 35 MX35 MX35 MX35 MX36 MN36 MN36 MN36 MN	TRACE OF ORGANIC MATTER         2         -3%         3         -5%         TRACE         1         -10%           LITTLE ORGANIC MATTER         3         -5%         5         -12%         LITTLE         10         -20%	HAMMER IF CRYSTALLINE.						
LUXUTD LUXUT 448 MX41 MN 488 MX41 MN 488 MX41 MN 488 MX41 MN 50 LLS WITH PLASTIC DADEX 6 MX N.P. L8 MX104 MX11 MN 11 MN 168 MX104 MN 11 MN L1TTL FOR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS I (V. SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLC						
RAGIN DUCK 6 MA NAP HB MXHB MXHB MXH1 MN 11 MN 18 MXHB MXH1 MN HI MN LITTLE OR HIGHLY GROUP INDEX 8 8 8 8 8 4 MX 8 MX12 MX16 MXNo MX MODERATE ORGANIC	HIGHLY ORGANIC >18% >28% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.						
INTIAL TYPES STANE ERASS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSP/						
OF NAJOR GRAVEL AND FINE SLITT OR CLATET SLITT CLATET MATTER	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 (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK H						
AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMP						
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 > L.L 30	O-M- Spring or seepage	WITH FRESH ROCK. MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS						
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF S						
PRICESSON SOLUTION COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRU IF TESTED, WOULD YIELD SPT REFUSAL						
CONSISTENCY PENEINHIUM RESISTENCE CONTRACTOR CONSISTENCY (N-VALUE) (TONS/F12 )	ROADWAY EMBANKMENT WITH SOIL DESCRIPTION	SEVERE ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT B						
GENERALLY VERY LOOSE (4 GENERALLY LOOSE 4 TO 10	SOIL SYMBOL OF AUGER BORING S- BULK SAMPLE	(SEV.) IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.						
MATERIAL MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL OTHER THAN	IF TESTED, YIELDS SPT N VALUES > 100 BPF						
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE >50		VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERI (V. SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG						
VERY SOFT <2 <@.25	INFERRED SOIL BOUNDARIES MONITORING WELL SAMPLE	REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ON						
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	INFERRED ROCK LINE	VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED. YIELDS SPT N VALUES ( 1						
MATERIAL STIFF 8 TO 15 1 TO 2	ALLUVIAL SOIL BOUNDARY	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLI						
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/025 DIP/DIP DIRECTION OF SLOPE INDICATOR TRIAXIAL SAMPLE	ALSO AN EXAMPLE.						
TEXTURE OR GRAIN SIZE		ROCK HARDNESS						
	SOUNDING ROD     REE     SPT REFUSAL	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIR SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.						
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.0 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOW						
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY		TO DETACH HAND SPECIMEN.						
(BLDR.) (COB.) (GR.) (CSE. SD.) (SL.) (CL.)	AR - AUGER REFUSAL PMT - PRESSUREMETER TEST BT - BORING TERMINATED SD SAND, SANDY	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN HARD EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED						
GRAIN MM 305 75 2.0 0.25 0.05 0.005	CL CLAY SL SILT, SILTY CPT - CONE PENETRATION TEST SLI - SLIGHTLY	BY MODERATE BLOWS.						
SIZE IN. 12" 3"	CSE COARSE TCR - TRICONE REFUSAL	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS (						
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST $\gamma$ - UNIT WEIGHT	POINT OF A GEOLOGISTS PICK.						
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	● - VOID RATIO F FINE W - MOISTURE CONTENT	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAME FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL						
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	FOSS FOSSILIFEROUS V VERY	PIECES CAN BE BROKEN BY FINGER PRESSURE.						
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED VST - VANE SHEAR TEST FRAGS FRAGMENTS	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READ						
LL LIQUID LIMIT	MED MEDIUM	FINGERNAIL.						
RANGE - WET - (W) ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING						
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TERM SPACING TERM THICKNESS						
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE		VERY WIDE MORE THAN 10 FEET THICKLY BEDDED 1.5 - 4 FEE						
SL SHRINKAGE LIMIT		MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FE						
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		CLOSE 0.16 TO 1 FEET THICKLY LAMINATED 0.000 - 0.03 FEET THICKLY LAMINATED 4.000 - 0.03 FEET THICKLY LAMINATED <0.000 FEE						
PLASTICITY	CME-45 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSU						
PLASTICITY INDEX (PI) DRY STRENGTH NON: C 0-5 VERY LOW		RUBBING WITH FINGER FREES NUMEROUS GRAINS;						
LOW PERSTICITY 6-15 SLIGHT	CME-550 CASING W/ ADVANCER HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.						
MED. PLASTICITY         16-25         MEDIUM           HIGH         26 OR MORE         HIGH	PORTABLE HOIST	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PRO BREAKS EASILY WHEN HIT WITH HAMMER.						
COLOR								
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY)	CORE BIT	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.	THER CME-850 OTHER 3.25 IN. ID HSA	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;						
		SAMPLE BREAKS ACROSS GRAINS.						

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
I-44ØØ	8.1952001	2	PG 9

	TERMS AND DEFINITIONS
ERRED L.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
Ø BLOWS. BY A ZONE	<u>AQUIFER</u> – A WATER BEARING FORMATION OR STRATA. <u>ARENACEOUS</u> – APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
LOWS	DR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
TE,	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
DCK TYPE	COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
ED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
ER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
F OPEN, WS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
R	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
AS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIG1NAL POSITION AND DISLODGED FROM PARENT MATERIAL.
ARED	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
DULL Rength Ick.	FORMATION (FM,) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
UT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN
IBLE BUT ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
ly Minor 1919 BPF	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
TE IS	ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY, TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN ANI EXPRESSED AS A PERCENTAGE.
ES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
UIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
POINT. IF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF A 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.
nts ., Thin	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
LINCH ILY BY	STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY1 TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
i	BENCH MARK: BL-41: MONUMENT SET IN MEDIAN
r	
ET FFT	ELEVATION: 2119.62 FT.
EET	NOTES:
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# TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG



ID.       ID.       I-4400       COUNTY       Henderson       GEOLOGIST       D. Teague         SITE DESCRIPTION       Dual Structures on I-26 over Clear Creek       GROUND WATER (ft)       SITE DESCRIPTION       Dual Structures on I-26 over Clear Creek       SITE DESCRIPTION       Dual Structures on I-26 over Clear Creek         BORING NO.       175       BORING LOCATION       420 +60       OFFSET 71ft. LT       ALIGNMENT       0       HR.       53.00         COLLAR ELEV.       2124.67 ft       NORTHING       599845       EASTING       970 678       24 HR.       53.00         TOTAL DEPTH       62.50 ft       DRILL MACHINE       CME 55 ATV       DRILL METHOD       3.25 in ID HSA       HAMMER TYPE       140 lb. manual         DATE STARTED       1/12/01       SUFFACE WATER DEPTH       SAMP.       V       L       D       SUL AND BOCK DESCRIPTION         ELEV.       DEPTH       BLOW COUNT       BLOWS PER FOOT       SAMP.       V       L       D       SUL AND BOCK DESCRIPTION       SUL AND BOCK DESCRIPTION	Ę	Ric	الالة	Ŋ											SHE	ET 1 OF	1		Ľ	TRIC	30	N					
DOINNE NO.         1/5         EDRINK LOCATION 420-40         OPFER 7 /R.L.T         LIAUMENT 1-         0 FR.         53.00           DTAL DEPTH. 22.5 /L         DEAL MACHINE CME SATV         DEAL MACHINE CME	OJE	CT NO.	8.19	52001			ID. I	-4400			COUNTY	/ Hend	lerson	1				]	PRO	JECT NO	. 8.19	52001		ID.	I-4400		C
COLLAGE LEV. 212.46 /f.         INORTHING         SPENDE         Last model         Market String         Market Strin	SITE DI	ESCRIP	PTION	Dual S	Structu	ires on	I-26 ov	ver Clea	ar Creek							GROUN	D WATER (ft)		SITE	DESCRI	PTION	Dual	Structu	res on I-26	over Clea	ar Creek	
TOTAL DEPTH 62.04 DIPLAL MACHEE (ME 59 ATV ] DIPLA MENTOD 325 In D1-BA   HAMMER TYPE 140 b. marula DEX 1000 DUPL 1020H ETC 1120   SUPCAS PERF 027   SUPA PER	BORING	g no.	175		B	ORING	LOCA	TION	420 +60	0	OFFS	ET 71	ft. LT		ALIGNMENT -L-	0 HR.	53.00		BOR	ING NO.	B-176	1	В	ORING LOO	ATION	420 +65	5
DATE STATED 1/1201 SUBPACE WATER DEPTH (17) 070 SUB COMP ETED 1/1201 SUBPACE WATER DEPTH (17) 070 SUBPACE WAT	COLLA	R ELEV	<b>1.</b> 212	4.67 ft	NOR	THING	5998	845			EAST	'ING 9	7 <b>0</b> 678	8		24 HR.	53.00		COL	LAR ELE	<b>V.</b> 212	3.04 ft	NOR	THING 59	9,88 <b>0</b>		
BEAV         DLOW         DLOW POX         DLOW POX         DLOW SPECTOOT         SAMP         Value         Samp         Sam	TOTAL	DEPTH	<b>i</b> 62.5	0 ft	DRIL	L MAC	HINE	CME	55 ATV	DRIL	L METH	IOD 3	.25 in	ID H	SA HAM	MER TYPE	140 lb. manual		тот	AL DEPT	H 62.3	80 ft	DRIL		CME	55 ATV	DRILL
(h)       (	DATE S	TARTE	ED 1/	12/01	•		COMF	PLETE	D 1/12/0	)1	SURF	ACE W	ATER	DEP	тн				DAT		ED 1/	10/01		co	MPLETED	<b>)</b> 1/11/0	)1
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ELEV.	DEPTH	BLO	ow cou	JNT			BLOW	S PER FO	от		SAMP.	▼/	ΊL					ELE	. DEPTH	I BL	ow co	UNT		BLOW	S PER FO	OT
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2067.67 57.00 2067.67 57.00 2067.67 62.00 62.50 50/0 50	2070-	-	WOH	1	1			· · · · ·	· · · · ·	· · · · ·	· · · · ·	SS-11	41.9		-	• • • /			105 207	u- <u>⊦-53.50</u> †	6	8	9	:::	· · · · · · · · · · ·	· · · ·	 
2065       12       5       6       62.00       62.00       62.00         62.50       50/0       300°       2062.17 Hard Weathered Rock-Grav Henderson Gneiss       62.00       62.00         62.50       50/0       300°       FUL       2062.17 Hard Weathered Rock-Grav Henderson Gneiss       50/0       62.00       62.00	2010	L				.[.	•••	· · · · ·	· · · · ·	· · · · ·	· · · · ·		1		- 2067.67		57.00		00T2	‡					· · · · ·	· · · · ·	 . <i>.</i>
2065 - 1 - 2062.67 - 62.00 - 62.50 - 50/0 -	1	58.50					: : : ך	· · · · · · · ·	$ \begin{array}{cccc} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \end{array} $	· · · · ·	· · · · ·			<u> </u>	<ul> <li>Residual: Medium Der</li> </ul>	ise, Moist, Gra	y, Silty	<u>-</u>		5					 	•••••	 
62:30         50/0         9710         2062:17 Hard Weathered Rock-Grav Henderson Gneiss         62:30         9         1         50/0         50	2065-+		12	5	6		<b>∳</b> 1j	· · · ·		· · · · · · · ·	· · · · · · · ·		м	.	- rifle JAND (A-2-4)				GPJ	‡	4	28	42				•7 <u>0</u>
50/0 50/0 - Auger Refusal at 62.50 ft (EL 2062.17) on Hard	-	62.50				· · ·	· <u>···</u>	· · · ·	· · · ·	· · · ·	· · · ·				- - 2062.67	Crowline	62.00	2	0132	62.30					 	· · · ·	
Image: Second		-	50/0								3070				<ul> <li>Auger Refusal at 62.50</li> </ul>	ft (EL 2062.17	) on Hard		0110		50/0				_	_	_
															<ul> <li>Rock (Henderson Gne</li> </ul>	ss)			N	‡							
	-	-													-				REN								
	-+													,	-				BOI	ŧ							
	-	-													-				<u>[00]</u>	ł							
	-														-				U-NC	1							
╺╤┈╶╩┈┈┶┟┈┈┶┶┈┈┶┶┈┈┙╸╸╸╸╸╸╸┥╸╴╵╴┵┈╧╴╴╸╸╸╸╴╌╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸╸			L	L	L							<u> </u>	<u>.</u>	<u> </u>					۳L	ł		ļ	1				

# TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

							SHEE	T 1 OF	1	
C	DUNTY	Hend	erson			GEOLOGI	ST D.	Teague		
					1			GROUN		R (ft)
		ET 21	ft. LT		ALIGN	IMENT -L-		0 HR.	53.0	0
	EAST		70,714					24 HR.	53.0	0
DRILL	METH		.25 in I		-		HAMM	ER TYPE	140 lb. n	nanuai
	SURF	ACE W			PTH					
80	100	SAMP.				SOIL ANI	D ROCK	DESCRIPTIC	NC	
1	100 I	NO.	<u>/ MOI</u>	G						
23.04	Ļ			. <u> </u>	2123.04					0.00
· · ·	· · ·			£[	-	Roadway Emba Moist, Brown ar	nd Red, (			
· · ·	· · ·		м	L!	-	Sandy SILT (A-	4)			
· · ·	· · ·			F	-					
· · ·	· · ·			EI.	-					
	· · ·	·	м	£Ľ.	-					
· · ·				Ľ.	- - 2110.54					12.EC
· · ·	· · ·	SS-3	18.0	ËŇ	L 2110.04	Roadway Emba Gray, Fine to M				12.20
· · ·			10.0	FR	E	Glay, Fille to M	eulum S		<u></u>	
· · ·	· · ·				- 2105.54	Roadway Emba	nkmont:	Modium Stiff		17 50
· · ·			м	FI.	Ĺ	Stiff, Moist, Red				
• • •				FI.	F					
				L.	1.  -					
			м	Ľ	T.					
••••					r -					
			м		ļ.				÷	
					F					
••••	· · · ·				ł					
••••	· · · ·		м	L	Ļ					
· · · · · ·	•••				<u>}- 2086.54</u> 	Roadway Emba				36 .5C
••••	· · · ·		м	Ľ	+	Dense, Moist, T Medium SAND	an and ( with Gra	Gray, Silty Fin vel (A-2-4)	e to	
· · · ·	· · · · · ·				+					
· · · · · ·	· · · · · ·				<u>t</u>					
· · · ·	•••• •••		м	Ŀ	ļ.					
· · · · · ·	· · · · · ·				<b>†</b>					
· · · · · ·	$\cdot \cdot \cdot$		м	Ŀ	j- -					
· · · ·	$\cdot \cdot \cdot$				-					
· · · ·	· · · · · ·			Ŀ	<u>}</u>					
· · ·	••••		м	EE	<u>}</u>					
· · ·	· · ·			F;	•					
· · ·	· · ·	SS-12	w	ĘĿ	2064.04	Allerian				<u>59.001</u>
<u>.</u>	· · ·			Ĕ	- 2062.54 -	Alluvial: Very D SAND with Gra	vel (A-1-	b).		60 EC
				<u>n 1</u>	1 <u>2060.74</u>	Hard Weathere Auger Refusal a	at 62.30 f	eet. (EL 2060		62.3CI
					-	Hard Rock (Her	nderson	Gneiss)		
					-					ľ
					-					
					-					
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#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG



	CT NO. ESCRIP			Structur	ID.     I-4400     COUNTY     Henderson     GEOLOGIST       on I-26 over Clear Creek	GROUND WATER (ft)
BORING	G NO.	B-177		ВО	NG LOCATION 420+47 OFFSET 30 ft. RT ALIGNMENT -L-	0 HR. 56.00
COLLA	R ELEV	. 212	3.05 ft	NORT	NG 599,898 EASTING 970,765	24 HR. 56.00
TOTAL	DEPTH	60.5	0 ft	DRILL	ACHINE CME 55 ATV DRILL METHOD 3.25 in ID HSA HA	MMER TYPE 140 lb. manual
DATE S	STARTE	D 1/	11/01		COMPLETED 1/11/01 SURFACE WATER DEPTH	
ELEV.	DEPTH	BLC	ow cou	JNT		OCK DESCRIPTION
(ft)	(ft)	0.5ft	0.5ft	0.5ft	20 40 60 80 100 NO. MOI G	
123.05					Ground Surface Elev. 2123.05 2123.05	0.00
123.05	_	****				ent: Medium Stiff to Stiff,
2120-	- - 3.50					wn, Fine Sandy SILT (A-4)
1	-	4	6	6		
ł	-					
2115-	- 8.50					
Ŧ	-	2	2	3		
‡	-					
2110-	- 13.50 -	3	6	6		
. ‡	-					
2105-	- - 18.50					
Ē	-	2	4	4	·•••••••••••••••••••••••••••••••••••••	
I	-					
_‰- <u>†</u>	- 23.50	_			Li 2100.05	23.00 ent: Loose to Medium
Ŧ	-	3	2	25	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	Silty Fine to Medium SAND
ļ	-					
2095-	- 28.50 -	50/.3		[ 		untered from 26.00 to 27.00 29.50 ft.
ł	-					
2090-+-	- - 33.50					
2030 [	-	4	9	8		
Ŧ	-					
2085 - <del>[</del>	- - 38.50					
ŧ	-	6	7	7		
1	-					
2080 -	- 43.50	8	8	9		
Ŧ		5	5		··· <i>P</i> <sup>17</sup> ····································	
Ŧ	-				··/·····	
2075- <u>-</u> +	- 48.50	4	4	2		
‡	-					51.00
2070-	- 53.50				Alluviai: Medium St	iff, Moist, Gray, Fine Sandy
Ì		2	3	4		
ł	-					
2065-	- 58.50				-2064.55	58.50
ţ	- - 60.50	12	16	16		/et, Tan and Gray, Silty Fine 60.00 ith Rock Fragments (A-1-b)
‡	-	50/0			Solution International Interna	ck-Grav Henderson Gneiss / .50 feet (EL 2062.55) on
·	-				Hard Rock (Hender	son Gneiss)
/ <u> </u>						
Ŧ	-					
+	-					
ļ [	-					
	-					

	CT NO.		<b>N</b> J 52001			ID.	1-44	00		·		lc
	ESCRIP			Structur	os on				r C	rook		10
BORIN		B-178	Duart		RING							
			3.60 ft	NORT			9900					
	DEPTH			MACH					ick	DRIL		IETH
	STARTE		15/01				IPLE		-	/16/0	•	
ELEV.	·		ow cou	JNT						R FO		
(ft)	(ft)	0.5ft	0.5ft	0.5ft	ļ	20		40		60		80
2073.60	-				<u> </u>	Gro	und S	Surfa	ace	Elev.	20	73.6
	-						•••	•••				•••
2070 -	3.50	18	6	8		• • • •					:	· ·
	-					/	· · · ·	•••	· ·	· · · ·	:	•••
2065 -	8.50				:/	· · · ·	· ·	· ·	: :	· · · ·	:	•••
2005 -	-	1	1	1		 	· · · ·	•••	• •	· · ·	:	•••
•	-				: <u>  ·</u>		••	• •	•••		•	•••
2060 -	13.50	50/0	1			 	•••• •••	· · · ·	•••	· · ·	:	 
-						· · ·	· ·	: :	: :	· · ·	:	 
	-					· · ·	•••	· ·		· · ·	·	 
2055 -	-					• • •	•••	•••	•••	• • •	·	•••
-	-					• • •	• •	•••	•••	• • •	•	•••
۔ 2050	È						• •					
-							• •	•••	•••		•	•••
•	L					· · ·	•••	•••	•••	· · ·	•	•••
2045 -						· · ·	· ·	•••	•••	· · ·	:	•••
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#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

			·				SHE	EE	T 1	OF	1	
CC	DUNTY	Hend	erson			GEOLOG	SIST	D.	Teagu	е		
					1				GR	OUN		<b>२ (</b> ft)
	OFFS	ET 90	ft. LT			MENT -L-			. O	HR.	N/	M.
	EAST		70611				·			HR.	5.5	50
тн		.94 in. 1					HAI	MM	ER TY	'PE	140 lb. a	auto
_	SURF	ACE W			тн							
10	100	SAMP. NO.		L 0		SOIL AI	ND RO	СК	DESC	RIPTI	ON	
1	11	NU.	<u>/MOI</u>	I G							-	
.60	)				2073.60	Allerial Main	. 04:66	<u></u>	Dee			. 0.00
•••	· · · · · ·				-	Alluvial: Mois Sandy SILT (A		Gra	y-Brown	1 Fine	to Medium	
 	· · · · · ·	SS-1	19		_	NOTE: Bould	er enco	ount	tered fro	om 1.	8 to 3.5	
	· · · · · ·		<b></b>		- 2067.60	feet Alluvial: Very		W	ot Tan	and B	Brown Silty	6.00
 				[·]	-	Fine to Mediu						
 	· · · ·	SS-2	w	¦ . [	-							
•••	· · ·			••• 	- 2061.60	Hard Weathe	red Rov	ck-0	Grav Ho	ndere	on Gneise	12.00
•••	.50/0 <b>•</b>				2060.10	Hard Rock- V	ery Slig	htly	Weath	ered	to Fresh,	13.50
•••					-	Hard to Very I Henderson G						
•••	•••				-	Spacing.						
· ·	••••			$\gg$	-	Strata REC=1 Strata RQD=9	00% (2 94% (18	20.0 8.7)	)			
· ·	· · · · · ·			$\gg$	-							
 	•••			$\mathbb{N}$	-							
· ·	•••	RS-1		<b>\$\$\$</b>	-							
· ·	· · · · · ·				-							
•••	•••				-							
•••	· · ·				-							
					2040,10	Coring Termir	nated a	t 33	50 feet	(FL :	2040 10) in	33.50
					-	Hard Rock (H	enders	on (	Gneiss)	. (	2040.10) 11	
					-							
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#### TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT



PROJECT NO.         8.1952001         ID.         1.4400         C           M         SOTE DESCRIPTION         Dual Structures on I-26 over Clear Creek         M           SOBING NO.         B-178         BORING LOCATION         421:443         COLLAR ELEV.         2073.60         MORTHING         600.012           Build         TOTAL DEPTH         33.5 ft         DRILL MACHINE         CME ESD Track         DRILL           DATE STARTED         11/301         COMPLETED         11/801         COMPLETED         11/801           COLLAR ELEV.         DEPTH         RUN         PRILL         RUN         No.         REC.         Rob           BUID         DATE STARTED         11/301         COMPLETED         11/801         COMPLETED         11/801           COLLAR ELEV.         DEPTH         RUN         PRILL         RUN         No.         REC.         Rob           CULL         DEPTH         RUN         PRILL         RUN         No.         REC.         Rob           2040.1         33.5         Image: Run         Image: Run <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th>_</th><th></th><th></th><th></th><th>4400</th><th></th><th></th><th>c</th></td<>							_				4400			c
BORING NO.         B-178         BORING LOCATION         421+43           COLLAR ELEV.         2073.60         MORTHING         600,012           TOTAL DEPTH         33.5 ft         DRILL MACHINE         CME 850 Trisk         DRIL           DATE STARTED         1/15/01         COMPLETED 1/15/01         COMPLETED 0/15/01         CORR SIZE         NOC         TOTAL RUN         20.0 ft           ELEV.         DEPTH         RUN         DRIL         RE.         ROD         No.         RE.         ROD           0040.1         33.5         DATE         SMMP         SMMP         RE.         ROD         ROD         RE.         ROD         ROD         RE.         ROD         ROD         RE.         ROD         RD.         RE.         ROD	D (6)							ictur	00.00	1		or Croc	r	10
S0         COLLAR ELEV.         2073.60         ENORTHING         600.012           auto         TOTAL DEPTH         33.5 ft         ORILL MACHINE         CME 850 Track         DRIL           DATE STARTED         1/1501         COMPLETED         1/1501         COMPLETED         1/1601           CORESIZE         NO2         TOTAL RUN 20.0 ft         ELEV.         DEPTH         RUN         PRIL         RUN         REC.         ROD           (ft)         (ft)         (ft)         RD         RD<		:												
auto														
DATE STARTED         1/15/01         COMPLETED         1/16/01           CORE SIZE         NO2         TOTAL RUN         20.0 ft           ELEV. DEPTH RUN         PRULE         REC. ROD         SMMP.         STRATA           (h)         (h)         (h)         PRULE         REC. ROD         RCD           2040.1         33.5               2040.1         33.5               2040.1         33.5                2040.1         33.5                2040.1         33.5												850 Tr	ack	DRII
CORE SIZE         NQ2         TOTAL RUN 20.0 ft           ELEV. DEPTH RUN (n)	auto													
ELEV.         DEPTH (n)         RUN (n)         BAUP. (n)         SAMP. (n)         STBATA. REC.         RCD           2040.1         33.5							0/01							
(m)       (										<u>،</u>				
2040.1 33.5						t) (Mi	NTE   RE n./ft)   (ft	C.   F )	RODI					
				<u> </u>			%	<u></u>	<u>%</u>		%	<u>%</u>		
			204	0.1 3	33.5									
12 5 5 5														
		1												
		4			İ									
12 12														
22.50														
EC-NCD01_CORE#2 01100132.GP1 VCD012.GD1 222701														
EC.NCDO1_CORE#2 01100133.GFJ NCDO12.GD1 2/2			101											
		-	2127											
		1	GDT											
			012.											
			NCD											
			GPJ											
		ĺ	J132.											
			01100											
			#2 (											
			CORE											
			01_0	ľ	1									
			PCD -											
	22 50		B											

	<b>R</b> IC	ЗC	<b>N</b>										SHEE	T 1 QF	2
<b>PROJI</b>		<b>).</b> 8	.1952001			ID.	<b>I-</b> 4400		C	OUNTY Henderson		GEOLOG	IST D.T	eague	
SITE I	DESCR	IPTIC	N Dual	Structu	ires on	l-26 c	ver Cle	ear Cre	eek	-				GROUN	D WATER (ft)
BORIN	NG NO.	B1 <b>7</b> 8		<u> </u>	BOR	NG LO	CATIO	N 421+	43	OFFSET 90 ft. LT	ALIGNM	ENT -L-		0 HR.	N/M
			73.60						T	EASTING 970,746		-		24 HR.	5.50
				1	LL MAG	<b>1</b>				METHOD 2.94 in. Tri				ER TYPE	140 lb. auto
	_		1/15/01			<u>+</u>	PLETE AL RUN			SURFACE WATER DE					
CORE	DEPTH				UN	SAMP.		ATA							
(ft)	(ft)	(ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	NO.	REC.	RQD %		DES	CRIPTION AN	D REMARKS	S		
2060.1	13.5									Beg	in Coring @	2060.10 f	t		
		5.0	14:49	(5.0)	(4.4)		100%	94%		Hard Rock- Very S Hard, Light to Darl Wide Fracture Spa	slightly We k Gray He	athered to nderson (	o Fresh Gneiss V	, Hard to with Close	Very e to
				100%	88%			1							
			2:08							Strata REC=100% Strata RQD=94%	(18.7)				
			2:38												
			2:30												
	40 5		2:07												
2055.1	18.5	5.0		(5.0)	(4.4)										
$\bigcirc$			2:41	100%	88%										
			2:01												
			2:25												
			3:17												
0050 4			3:34												
2050.1	23.5	5.0		(5.0)	(4.9)										
			2:19	100%	98%										
			2:17												
						R5 -1									
			2:28		-										
			2:41												
			2:31												
2045.1	28.5	5.0		(5.0)	(5.0)										
		0.0	3:16												
				100%	100%										
			4:14												
$\mathcal{I}$			4:35												
2045.1															
			5:04												
	a		4:58						00.45						
2040.1	33.5	I	ł	I	I	I	I	I	2040 10						33 5

#### TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

			<u>SHEE</u>	T 2 OF	2
COUNTY Henderso	'n	GEOLOGI	ST D.1	Teague	
				GROUN	D WATER (ft)
OFFSET 90 ft. L1	Γ ALIGNM	ENT -L-		0 HR.	N/M
EASTING 970,74	46			24 HR.	5.50
LL METHOD 2.94 ir	n. Tricone		HAMM	ER TYPE	140 lb. auto
SURFACE WATE	R DEPTH				
DRILLER W. W	/hichard				
	DESCRIPTION AN	ID REMARKS			
C	Continued from p	revious pag	е		
Coring Termin (Henderson G	nated at 33.50 f neiss)	feet (EL 20	40.10	) in Hard F	Rock
	110100)				

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**ROCK PHOTOGRAPHS** 

Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B1-A



Box 1 of 2



Box 2 of 2

PG 13



# TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

JE	CT NO.	8.19					i-44				Τ	COU	NTY	Hend	lerson	1		GEO	LOGIST	D.		
㐠D	ESCRIP	TION	Dual S	Structur																	GROUND WATE	R (ft)
ORIN	g no.	B-179		BO	RIN	G LO	CATIO	DN	421+	-51		O	FFSE	ET 14	ft. LT	_	ALIG	NMENT	-L-		0 HR. N/	M
OLLA	R ELEV	. 206	8.28 ft	NORT	HINC	G 5	9995	2·_				E/	ASTI	NG 9	7066	7					<b>24 HR.</b> 0.2	20
OTAL	DEPTH	29.0	0 ft	DRILL	. MA	CHIN	ΕC	ME 8	350 T	rack	DRI	LL ME	ETHO	<b>DD</b> 2	.94 in	. Tri	cone		НА	MM	ER TYPE 140 lb. a	auto
ATE S	TARTE	D 1/3	23/01			Со	MPL	ETED	1/2	23/01		รเ	JRF	ACE W	ATER	R DE	PTH					
LEV.	DEPTH	BLO	ow cou	JNT			В	LOWS	PER	F00	т			SAMP.	▼/	1				2014	DEGODIDITION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 i	2	20	40 1		60 I	80 I	)	100	NO.	мо	0   G		50	IL AND RC	JCK	DESCRIPTION	
68.28						Gr	ound	Surfa			2068	28			-		2068.2	•				
1								• • •		. <u>iev.</u> 2						+		Alluvial:	Very Loose	e, We	et, Gray, Silty Fine to	2
+	- 3.50				•••	•••	••••	•••	 	•••	 	•••				F	• 2066.2		Medium [	Dens	se, Moist, Gray, Silty	2
2065-+	-	7	7	5	•••	●i2	· · ·	•••	· · ·	•••	 	•••			м	+:		(A-2-4)	oarse SAN	ID wi	th Rock Fragments	
Ŧ	-				•••	<u> </u>										in	<u> - 2062.2</u>	8	thered Roo	:k-G	ray Henderson Gneiss	6
+ 2060 <del>-</del> †	- 8.50					•••				•••	••••	•••	:			$\mathbb{N}$	- 2059.2	8				9
<b> </b>	-	100/.5			· ·   · ·	•••	•••	•••	· · ·	· · · ·	· · ·	100/	.5 <b>•</b>			Š	<u>, 2000.2</u>	Hard Roo	k- Very Sli	ghtly	Weathered to Fresh, to Dark Gray	3
ţ	-				•••	•••	•••	•••		•••	· · ·	•••				K	-	Henderso			Close to Wide Fracture	
2055-	-				•••	•••	•••			•••	•••		• •			$\mathbb{R}$	₹	Spacing.				
+	-				•••	•••	•••	•••	• • •	•••	•••	• •	• •			$\bigotimes$	≸		EC=100%( 2D=87%(1			
Ŧ	-				•••	• •	• • •	• • •		• •						$\otimes$	\$			,		
2050-	-				•••	•••			· · ·	•••	· · · · · ·					$\otimes$	<u>_</u>					
+	-				•••	::	•••	•••	· · ·	•••	 	•••				$\mathbb{K}$	}					
+	-				•••	•••	••••	•••		•••	••••	•••	• •	KS-3		$\mathbb{R}$	¥					
` <del>1</del> 5-+	-				• •	• •	• • •	•••		• •		• • •				$\gg$	⇇					
./ :	-				•••	•••	· · ·			•••	· · · · · ·	•••				$\otimes$	\$					
+ ≠−2040	-				•••	•••	• • • • • •	••••	· · ·	::	 	• • •				$\mathbb{K}$	€	_				
2040 <i>-</i> 7 [	-																2039.2 [	Coring T			.00 feet (EL 2039.28) in	29
+	•																F	Hard Roo	k (Henders	son (	Gneiss)	
T +	-																F					
‡	-																Ę					
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# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT



<u>.</u>					<b>IN</b> .1952001				I-4400			DUNTY H	ondoraan			SHEE Logist D.	T 2 OF	۷
					N Dual						I		enderson		GEO	LUGIST D.		WATER (ft)
WATER (ft) N/M			NG NO.				BORIN					OFFSET	14 ft   T		GNMENT	-l -	0 HR.	
0.20			AR ELE		2068.28	/				4211			970,678		GINILINI	-L-	24 HR.	0.20
40 lb. auto										850 T	rack DRILL					НАММ		140 lb. auto
			START		1/23/01			-	PLETE				E WATER I					140 10. 2010
		CORE		NQ					AL RUN				W. Whi					
			DEPTH			R		SAMP.		RATA								
	•	(ft)	(ft)	(ft)	DRILL RATE (Min./ft)	REC. (ft)	RQD (ft)	NO.	REC.	RQD			DE	ESCRIPTIO	N AND REM	IARKS		
						%	<u>%</u>		%	<u>%</u>			0	- K				<u>.</u>
ry		2039.3	29.0				·					Corina	Terminat	ed at 29	om previou .00 feet (l	s page EL 2039.28	) in Hard R	ock
.,												(Hende	erson Gne	eiss)			,	
	4																	
														-				
	:																	
	1	27/01																
		12																
		2.GD																
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		ž																
		2.GF																
		0013																
		01																
		RE#2																
		õ																
		TEG-NCDOT_CORE#2 01100132.GPJ NCDO12.GDT 2/2/01																
		N N																
29.00		비	l	I		I			I	I	Ι							

-KOJE	ECT NO	<b>).</b> 8.	1952001			ID.	<b>I-</b> 4400		cc	UNTY He	nderson		GEOLOG	SIST D.	Teague	
SITE D	ESCR	PTIO	N Dual	Struct	ures or	י ו I-26 ס	ver Cle	ar Cre	k I				•		GROUN	ID WATER (ft)
BORIN	G NO.	B-1	79	E	BORING	G LOCA		421+	61	OFFSET 1	4 ft. LT	ALIGNM	ENT -L-		0 HR.	N/M
COLLA	AR ELE	V.	2068.28		RTHING	<b>5</b> 599	,980			EASTING	970,678				24 HR.	0.20
TOTAL	DEPT	<b>H</b> 29	9.0 ft	DRI	LL MAG	CHINE	CME	850 <b>T</b>	ack DRILL	METHOD	2.94 in. Trico	one		HAMN	IER TYPE	140 lb. auto
DATE			1/23/01				PLETE				WATER DEP					
CORE		NQ2		RI	IN	L	AL RUN	1 20.0 RATA	ft	DRILLER	W. Whicha	rd				
ELEV. (ft)	(ft)	(ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC.	RQD %			DESCR			(S		
2059.3	9.0										Begin	Coring @	2059.28	ft		
		5.0	3:09	(5.0) 100%	(4.1) 82%		100%	87%		Hard Ro Hard, Lie Wide Fra	ck- Very Sli ght to Dark acture Spac	ghtly We Gray Her ing.	athered f nderson (	to Fresh Gneiss	n, Hard to with Close	Very to
			2:33							Strata R Strata R	EC=100% QD=87% (1	(20.0) 7.4)				
			2:16													
			2:36													
2054.3	14.0		2:16													
		5.0	1:51	(5.0) 100%	(3.3) 66%											
<u> </u>			1:38													
			1:24													
			2:41													
2049.3	10.0		2:36													
2049.3	19.0	5.0	2:02	(5.0) 100%												
			2:01	100 %	100 /0											
			2:05			<u> R5-3</u>										
			2:35													
			2:01													
2044.3	24.0	5.0	1:55	(5.0)												
			2:16	100%	100%											
)			2:26													
2044.3			2:36													
			2.00													

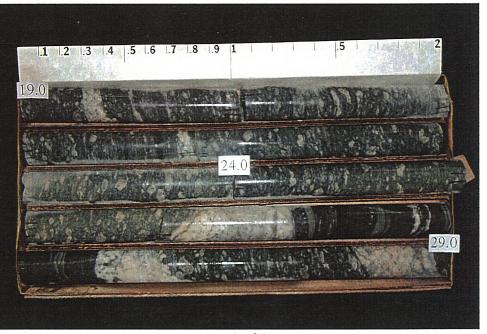
# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

**ROCK PHOTOGRAPHS** 

Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B1-C



Box 1 of 2



Box 2 of 2

#### PG 16



#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

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100	CT NO.						-4400		CO	DUNTY	Henc	erson		GEOLOGIST D	1
	ESCRIP		Dual	•			ver Clear								GROUND WATER
BORIN							TION 4	21+46			ET 29			ALIGNMENT -L-	0 HR. N/M
COLLA											ING 9				<b>24 HR.</b> 1.00
TOTAL				DRILL	. MAG	1	CME 85	1	DRILL						MER TYPE 140 lb. au
DATE S			22/01		I	COM	PLETED			SURF	ACE W		DEP	7TH	
	DEPTH			UN 1 0.5ft	٩ ٩	20	40 40	PER FOOT	80	100	SAMP. NO.		o	SOIL AND ROC	K DESCRIPTION
(ft)	(ft)	0.5ft	0.5ft	0.51	Ĭ	Ĩ	ï	ĩ	ĩ		140.	<u>/моі</u>	G		
2069.11						Grou	nd Surfac	e Elev. 2	<u>069.11</u>					2069.11	Not Grov Silty Fing to
1	-					· · · ·	· · · ·	· · · · · ·	· · ·	•••			[•]	Alluvial: Very Loose, V Medium SAND with Gr	avel (A-2-4)
2065-	- 3.50	4		7		•••••	· · · · ·		· · ·	· · ·	SS-1	м	<u>  ·  </u>	2065.11	
	-		-			<u> </u>	<u>· · · ·</u>	<u></u>	<del>. : : :</del>	÷÷i			rt i	2063.61 Residual: Medium De	(A-2-4)
-	- - 8.50									::			$\mathbb{N}$	Hard Weathered Rock	-Gray Henderson Gneiss
2060-	<u>- 9.30</u>	-50/1-			1::			•••••		50/ 1 50/0				2059.81 Hard Rock- Slightly We	eathered to Fresh, Hard
	-	50/0					• • • •			• • •	RS-Z			to Very Hard, Light to I Gneiss with Very Close	Dark Gray Henderson
-	-							· · · · · ·		•••			$\gg$	- Gheiss with very close	e to wide Flacture
2055-	-					· · · · ·		· · · · · ·	· · · · · ·	· · · · · ·			$\otimes$	- Strata REC=85% (3.8)	
	-						· · · ·	· · · · · ·	· · · · · ·	· · · · · ·				- <u>Strata ROD=71% (3.2)</u> 2051.81 Soft Weathered Rock-	
2050-	-									· · ·			$\bigotimes$		1
2030	-								· · ·	• • •			$\otimes$	<ul> <li>Strata RQD=14% (0.5)</li> </ul>	)
1	-								• • •				$\parallel$	to Very Hard, Light to I	
2045-	-							· · · · · ·						<ul> <li>Gneiss with Very Close</li> <li>Spacing.</li> </ul>	e to Wide Fracture
+	-						· · · ·	· · · · · ·	· · · · · ·	· · ·			$\mathbb{Z}$	- Strata REC≈100% (2.0	))
1							· · · · · · · ·	· · · · · ·	· · ·	· · · · · ·			$\gg$	<ul> <li>Strata RQD=40% (0.8)</li> </ul>	
2040	-					· · · ·	· · · · ·		· · ·	· · ·			$\gg$	<ul> <li>Dark Gray Henderson</li> </ul>	Gneiss with Moderately
	-								· · ·	· · ·			$\otimes$	Close to Wide Fracture	
2035-	-				 		 	 		•••			$\parallel$	Strata REC=100% (10 2034.81 Strata RQD=91% (9.1)	, I
2030	-												ł	Coring Terminated at 3 Hard Rock (Hendersor	34.30 feet (EL 2034.81) in Gneiss)
1	-													-	· -··,
-1	-													-	
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# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT



OF 2				SL	JN							
	ľ	PROJ		). 8	.1952001			ID.	I-4400			OUNT
ROUND WATER (ft)	ŀ				N Dual		ures or	,		ar Cree		
HR. N/M	ľ		IG NO.						ATION			OFF
HR. 1.00	·		AR ELE		2069.11				975	421740	)	EAS
YPE 140 lb. auto	ŀ		L DEPT			t –				850 Tr	ack DRIL	
	·		START						PLETE			SUR
	ŀ	CORE		NQ:				+				DRIL
	ľ		DEPTH	·			JN	SAMP.		ATA		
		(ft)	(ft)	(ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	NO.	REC.	RQD %		
	t		00.0			70	70		%	/0		
/ery Hard, lose to	ļ	<u>2039.8</u>	29.3	5.0	1:51	(5.0) 100%						
					1:46							
					2:07							
					2:28							
13.80		2034.8	34.3		2:13						2034.81	
17.30 Very Hard, ose to 19.30 K Gray Fracture	FEC-NCDOT_CORE#2 01100132.6PJ NCDOT2.6DT 2/27/01											Сс (H

	G	Ĵ									SH	EET 1 OF 2	
PROJECT N	<b>IO</b> . 8	.195200	1		ID.	I-4400		c	OUNTY Henderson	[	GEOLOGIST	D.Teague	
SITE DESCI	RIPTIC	N Dua	I Struct	ures or	ו I-26 o	ver Cle	ar Cree	ek				GROUND WA	TER (ft)
BORING NO	). B-	180	E	BORIN	G LOCA	ATION	421+4	46	OFFSET 29 ft. RT	ALIGNME	ENT -L-	0 HR.	N/M
COLLAR EL	<u>.e</u> V.	2069.1		RTHING	<b>3</b> 599	975	1		EASTING 970705			24 HR.	1.00
TOTAL DEP	тн з	84.3 ft	DRI	LL MA	CHINE	CME	850 <b>T</b> I	rack DRILI	LMETHOD 2.94 in. Tric	cone	HAI	MMER TYPE 140	lb. auto
DATE STAR	TED	1/22/01	<u>.</u>		COM	PLETE	D 1/2	3/01	SURFACE WATER DE				
CORE SIZE	NQ				· · · · ·	AL RUN		ft	DRILLER W. Whicha	ard			
ELEV. DEPTI	H RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	UN RQD (ft) %	SAMP. NO.	<u>STR</u> 	ATA RQD %		DESC		D REMARKS		
2059.8 9.3	3								Begi	in Coring @	2059.81 ft		
	5.0	2:57	(4.1) 82%	(3.2) 64%		85%	71%		Hard Rock- Slightly Light to Dark Gray Wide Fracture Spa	y Weathere Hendersor acing.	ed to Fresh, H n Gneiss with	lard to Very Hard Very Close to	,
		2:46			R5-2				Strata REC=85% ( Strata RQD=71% (	(3.8) (3.2)			
		3:27											
		3:00											
2054.8 14.3		0:39				29%	14%	2055.31	Soft Weathered Ro	-	lenderson Gn	eiss	13.80
$\overline{}$	5.0	1:10	(2.7) 54%	(1.3) 26%					Strata REC=29% ( Strata RQD=14% (	1.0) (0.5)			
		0:51											
		0:36						_2051.81					17.30
		1:23				100%	40%		Hard Rock- Slightly Light to Dark Gray Wide Fracture Spa	y Weathere Hendersor Icing.	ed to Fresh, H n Gneiss with	lard to Very Hard Very Close to	,
2049.8 19.3		1:05	(5.0)	(4.4)		100%	019/	_2049.81	Strata REC=100% Strata RQD=40% (		and land link		19.30
	5.0	2:13	(5.0) 100%	(4.1) 82%		100%	91%		Hard Rock- Fresh, Henderson Gneiss Spacing.		ery Hard, Lign erately Close t	o Wide Fracture	
		1:58							Strata REC=100% Strata RQD=91% (	(10.0) (9.1)			
		1:45											
		1:51											
2044.8 24.3	3 5.0	2:11	(5.0)	(5.0)									
	5.0	3:12	100%										
)		2:55											
		2:25				-							
039 8 29 3		1:54											
039 8 29	3	1:43											

# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

		SHEE	T 2 OF	2
COUNTY Henderson	GEOLOG	IST D.	Teague	
			GROUN	D WATER (ft)
I	IENT -L-		0 HR.	N/M
EASTING 970705			24 HR.	1.00
LL METHOD 2.94 in. Tricone		HAMM	IER TYPE	140 lb. auto
SURFACE WATER DEPTH				
DRILLER W. Whichard				
DESCRIPTION AN	ND REMARKS	6		
Continued from p	revious pag	je		
1 Coring Terminated at 34.30 t	feet (FL 2)	134 81	) in Hard F	34.30 Rock
Coring Terminated at 34.30 (Henderson Gneiss)		504.01	/ In Flara I	

PG 18

**ROCK PHOTOGRAPHS** 

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Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B1-B



Box 1 of 3



Box 2 of 3



#### PG 19

# **ROCK PHOTOGRAPHS**

Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B1-B

Box 3 of 3



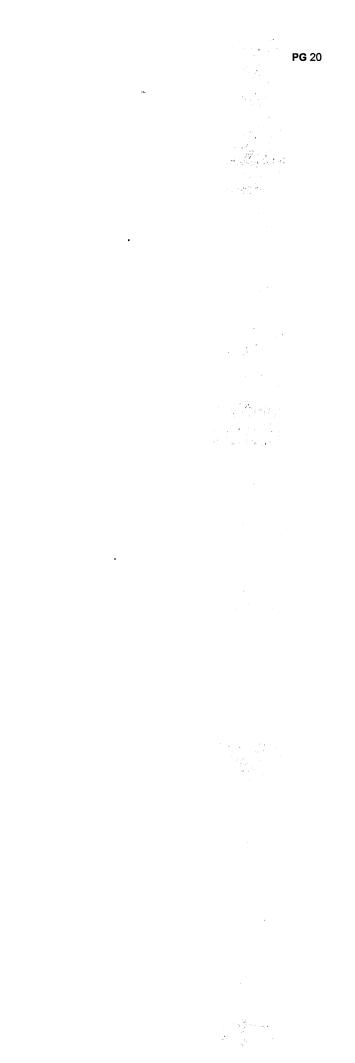
#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

2RING 2LLAR TAL D TE ST. EV. DI ft) 4.42 070-1 	ELEV. DEPTH TARTED DEPTH (ft) 3.50 8.50	B-181 2074.42 38.20 ft	ft NORT DRILL I COUNT ft 0.5ft	BORIN HING MACHI C	I-26 over 0 G LOCATIO 599952 NE CME 8 COMPLETED BLOWS 20 40 1 COMPLETED BLOWS 20 40 1 COMPLETED C	0N 422+( 350 Track 1/30/01 PER FOO 60 1	0 2 DRILI T 80	EAST METH SURF	ACE W SAMP.	7 <b>0</b> 582 .94 in.	2 Tricor DEPT		GROUND WATER (ft 0 HR. N/M 24 HR. 6.30 MER TYPE 140 lb. auto
4.42 070	ARTEL           DEPTH           (ft)           3.50           8.50	1/29/01           BLOW C           0.5ft         0.5           50/.2	I COUNT ft 0.5ft	0 0	BLOWS	0 1/30/01 6 PER FOO 60 1	T 80 1	<b>SURF</b>	ACE W SAMP.		DEPT	H	
4.42 070-1- 065-1- 1	)EPTH (ft) 3.50 8.50	BLOW C 0.5ft 0.5 50/.2	:OUNT ft 0.5ft	9 1	BLOWS 20 40	60 60	80 1	100	SAMP.		L		C DESCRIPTION
ft) 4.42 070-1 065-1 1	(ft)	0.5ft 0.5	ft 0.5ft	1	20 40 I I	60 I	80 1	1		моі	0	SOIL AND ROCK	C DESCRIPTION
4.42	<u>3.50</u> 8.50	50/.2		1		I	•	1	NO.				
070-+ + 	8.50		H 1	G	Ground Surfa	ace Elev. :	<u>2074.4</u>	<u>2</u> 					
	8.50		H 1		· · · · · · · ·	• • • • •	 	•••	T			2074.42	_
	8.50		H 1		· · · · · · ·	<u> </u>					• -	Alluvial: Very Loose, M Fine to Medium SAND	oist to Wet, Gray, Silty (A-2-4)
			H 1				 <del></del> .	50/:2		м	[·]	NOTE: Boulderencour	ntered from 1.00 to 3.80
		woн wo	H 1	: : :		· · · · · ·	· · · ·	•••		▼	╞∶₣	feet	
		WOH WO	H 1		· · · · · · ·	· · · · · ·	· · · ·	· · · · · ·		]	[•]		
T	13.20			<b>•</b> 1		· · · · · ·	· · · ·	· · · · · ·	SS-2	W	[• <del>]</del>		
T	13.20				 	• • • • • • • • • • •	 <u></u>	· · ·				2062.22 2061.22 Hard Weathered Rock-	Grav Henderson Gneiss
		50/0			· · · · · · ·	· · · · · ·	· · · · ·	50/0 <sup>©</sup>				Hard Rock- Fresh, Very	/ Hard, Light to Dark
ŧ								· · · · · ·				Gray Henderson Gneis Spacing. NOTE: Close Fracture	
									RS-4	:		20.3 feet.	Spacing from 20.0 to
055												Strata REC=100% (25.0 Strata RQD=99% (24.9	0)
ŧ												Suala RQD-33% (24.3	)
050-													
ŧ								· · ·					
‡													
045 +								· · · · · ·			$\boxtimes$		
Ŧ						· · · · · ·	· · · ·	· · ·			$\mathbb{N}$		
040				· · · ·	· · · · · · ·	•••••	· · · ·	· · · · · ·			₿\$₽₽		
Ī				· · · ·	· · · · · · ·	· · · · · ·	· · · ·	· · · · · ·			∭E.		
T T							<u></u>	•			<u>un</u>	2036.22 Coring Terminated at 3	8.20 feet (EL 2036.22) in Gneiss)
ł												Hard Rock (Henderson	Gneiss)
ţ													
$\pm$													
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# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT



TRIGON	SHEET 1 OF 2	( <u>TRIGON</u> )
ROJECT NO. 8.1952001 ID. I-4400	COUNTY Henderson GEOLOGIST D.Teague	PROJECT NO. 8.1952001 ID. 1-4400
SITE DESCRIPTION Dual Structures on I-26 over Clear Creek	GROUND WATER (ft)	SITE DESCRIPTION Dual Structures on I-26 over Clear Creek
BORING NO. B-18I BORING LOCATION 422+02	OFFSET 8I ft. LT ALIGNMENT -L- 0 HR. N/M	BORING NO. B-181 BORING LOCATION 422+02
COLLAR ELEV. 2074.42 NORTHING 599952	EASTING 970582 24 HR. 6.30	COLLAR ELEV. 2074.42 NORTHING 599952
TOTAL DEPTH 38.2 ft DRILL MACHINE CME 850 Track DRI	LL METHOD 2.94 in. Tricone HAMMER TYPE 140 lb. auto	TOTAL DEPTH 38.2 ft DRILL MACHINE CME 850 Track DRI
DATE STARTED 1/29/01 COMPLETED 1/30/01	SURFACE WATER DEPTH	DATE STARTED 1/29/01 COMPLETED 1/30/01
CORE SIZE NQ2 TOTAL RUN 25.0 ft	DRILLER W. Whichard	CORE SIZE NQ2 TOTAL RUN 25.0 ft
ELEV.     DEPTH     RUN     DRILL     RUN     SAMP.     STRATA       (ft)     (ft)     (ft)     (ft)     (ft)     (ft)     NO.     REC.     RQD	DESCRIPTION AND REMARKS	ELEV. DEPTH RUN DRILL RUN SAMP. STRATA
ELEV.     DEPTH     RON     DRILL     RATE     REC.     RQD       (ft)     (ft)     (ft)     (Min./ft)     (ft)     (ft)     NO.     REC.     RQD       %     %     %     %     %     %     %		(ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)
2061.2 13.2	Begin Coring @ 2061.22 ft	2041.2 33.2
5.0 (5.0) (5.0) 100% 99%	Hard Rock- Fresh, Very Hard, Light to Dark Gray Henderson	5.0 (5.0) (5.0)
5:46 100% 100%	Hard Rock- Fresh, Very Hard, Light to Dark Gray Henderson Gneiss with Wide Fracture Spacing. NOTE: Close Fracture Spacing from 20.0 to 20.3 feet.	1:58 100% 100%
	Strata REC=100% (25.0) Strata RQD=99% (24.9)	
5:21	Strata RQD=99% (24.9)	1:54
6:12		2:08
4:25		2:04
4.23		2.04
3:56		1:55
2056.2 18.2		2036.2 38.2 2036.22
5.0 (5.0) (4.9) <u><b>R5-4</b></u>		
4:37		
5:09		
6:03		
5:51		
2051.2 <sup>1</sup> 23.2 <sup>1</sup> 5.0 (5.0) (5.0)		
6:35		
	·	
7:10		
7:32		
8:16		ξ
10:05 2046.2 28.2		
6 5.0 (5.0) (5.0)		
2:58 100% 100%		
		20
5.0         2:58         100%         100%           2:16         2:16         100%         100%		
2:15		
₽ <u>2041.2_33.2</u>		

#### PG 21

# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

						SHEE	T 2 OF	2	
		C	DUNTY Henderson		GEOLOG	SIST D.	league		
ree	ek						GROUN		R (ft)
2+(	02		OFFSET 8I ft. LT	ALIGNM	ENT -L-		0 HR.	N	/M
			EASTING 970582				24 HR.	6.	30
Tr	ack DR	ILL	METHOD 2.94 in. Tric	one	-	HAMM	ER TYPE	140 lb.	auto
/30	0/01		SURFACE WATER DEP	РΤΗ					
5.0	ft		DRILLER W. Whicha	ard	· · · · · · · · · · · · · · · · · · ·		·		
2D			DESC	RIPTION AN	ID REMARK	ĸs			
			Contin	ued from p	revious pa	ige	·		
							•		
	2036.2	22							33.20
			Coring Terminated (Henderson Gneiss	at 38.20 f	feet (EL 2	2036.22)	in Hard F	Rock	

**ROCK PHOTOGRAPHS** 

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Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B2-A



Box 1 of 3



Box 2 of 3

# **ROCK PHOTOGRAPHS** Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B2-A



Box 3 of 3



#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

JIE	CT NO.	8.195	52001		]I	D. I-4	400		C	OUNTY	Henc	lerson		GEOLOGIST D.	T 1 OF 1 Teague	_
	ESCRIP	TION	Dual S	Structur	es on I-	26 ove	r Clear C	Creek							GROUND WATER	(ft
BORING	g no.	B-182		BC	RING L	OCATI	<b>ON</b> 42	2+09		OFFS	<b>ET</b> 27	ft. LT		ALIGNMENT -L-	0 HR. N/A	4
COLLA	R ELEV	. 2067.	57 ft	NORT	HING	59999	1.			EAST	ING 9	70621			24 HR. N/A	4
OTAL	DEPTH	28.6	0 ft	DRILL	. MACH	INE (	CME 850	) Track	DRILL	. METH	OD 2	.94 in.	Tric	one HAMM	IER TYPE 140 lb. au	uto
	STARTE		24/01				ETED	1		1				PTH 0.5		
	DEPTH			INT				ER FOOT			SAMP.		L			
(ft)	(ft)	0.5ft	0.5ft	0.5ft	٩ ٩	20	40	60	80	100		MOI	0	SOIL AND ROCK	DESCRIPTION	
. ,	.,					1	1					10101				
068.07	-0.50 0.00					Water Ground	Surface	Elev. 20 e Elev. 2	68.07 067.5	7				- 2007.57		
-	-												• • •	- Alluvial: Very Loose, W - Coarse SAND with Grav	et, Tan, Silty Fine to	
2065-	- 3.50					· · · · ·	· · · · ·	••••	· · · ·	· · · · · <u>·</u>			• •	2064.57		
	-	50/.1				· · · ·		· · · ·	· · ·	50/.1 <b>•</b>				- 2063.97 Hard Weathered Rock- - Hard Rock- Slightly to V	ery Slightly Weathered,	
-	-				• • •				• • •	· · ·				<ul> <li>Moderately Hard to Very</li> <li>Gray Henderson Gneiss</li> </ul>	Hard, Light to Dark	
2060 -	-					· · · · ·	· · · · ·		· · ·	· · · · · ·	RS-6		Ŵ	2058.97 Moderately Close Fractu	ire Spacing.	
-	-					· · · ·	· · · ·	· · · ·	· · ·	· · ·				- Strata REC=96% (4.8)	ſ	
-	-							• • • •	• • •					Strata RQD=60% (3.0) Hard Rock- Fresh, Very	Hard Light to Dark	
2055-	-								· · ·					<ul> <li>Gray Henderson Gneiss</li> </ul>		
-	-					· · · ·	· · · ·	· · · ·	· · ·	 			))))	Fracture Spacing		
-	.						• • • •	• • • •	•••	•••			\$\$	Strata REC=100% (20.0 Strata RQD=100% (20.0	))	
2050 -	-													0(20.0	<i>'</i> )	
-	-					· · · · ·	· · · ·	· · · · ·	· · · ·	· · · ·				-		
- 1	-							• • • •	•••				$\gg$	•		
)5-	-												\$\$\$	-		
- 1	-					· · · ·	· · · ·	· · · ·	· · · ·	· · · · · ·				-		
-	-								•••				$\gg$	-		
2040 -	-					<u></u> .	<u> </u>		<u> </u>	· · ·			$\gg$	2038.97		2
	• - - - -													Coring Terminated at 28 Hard Rock (Henderson ( - - - - -	Gneiss)	
	-													_		
+	-								-				ļ	-		
+	-												F	-		
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# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT



		٦L	IN								SHEE	1 OF 2		L		LjL	JN						
- KOJE		. 8.	1952001			ID.	<b>I-44</b> 00		C	COUNTY Henderson GEOLOG	IST D.T	eague		PRO	JECT N	<b>0.</b> 8.	1952001			ID.	<b>I-4</b> 400		
SITE D	DESCRI	PTIO	N Dual	Struct	ures or	n I-26 o	ver Cle	ear Cre	ek			GROUND WATER (	t)	SITE	DESCF		N Dual	Struct	ures on	n I-26 o	ver Clea	ar Cre	эk
BORIN	IG NO.	B-1	82	E	BORIN	G LOCA	TION	422+	• <b>0</b> 9	OFFSET 27 ft. LT ALIGNMENT -L-		0 HR. N/A		BOR	ING NO	. B2-	С	E	BORING	G LOCA	TION	422+	<b>0</b> 9
COLLA	AR ELE	V.	2068.07	f NOF	RTHING	<b>3</b> 599	991			EASTING 970621		24 HR. N/A		COL	LAR EL	EV.	2068.07	fl NOF	RTHING	599	991		
ΤΟΤΑΙ	L DEPT	H 28	3.6 ft	DRI	LL MA	CHINE	CME	850 T	rack DRILL	L METHOD 2.94 in. Tricone	HAMME	R TYPE 140 lb. aut	o '		AL DEP			DRI		CHINE	CME	850 Ti	ack
	START		1/24/01				PLETE			SURFACE WATER DEPTH 0.5				· · ·			1/24/01			<u>.</u>	PLETE		
	SIZE				16.1				D ft	DRILLER W. Whichard				·		· · · · · · · · · · · · · · · · · · ·		<u></u>	INT	_ <u></u> ~			ft
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	STF REC. %	1		DESCRIPTION AND REMARK	S			ELEV (ft)	. DEPT⊁ (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STR REC. %	RQD %	
064.0	3.6									Begin Coring @ 2063.97 f	<u> </u>			2044.	23.6								
		5.0	3:03	(4.8)	(3.0)		96%	60%		Hard Rock- Slightly to Very Slightly W Hard to Very Hard, Light to Dark Gray Close to Moderately Close Fracture S	eathere Hender	d, Moderately son Gneiss with				5.0	3:41	(5.0)	(5.0)				
				96%	60%						bacing.							100%	100%				
		Ì	2:39							Strata REC=96% (4.8) Strata RQD=60% (3.0)							3:24						ĺ
			1:57														4:24			-			
			3:06														4:07						
			1:11			<u>R5.6</u>											3:31						
059.0		5.0		(5.0)	(5.0)		100%	  100%	2058.97	Hard Bock Fresh Very Hard Light to	Dark G	ray Handarson	8.60	2039.	28.6								20
		5.0	2:20				10070	100 /		Hard Rock- Fresh, Very Hard, Light to Gneiss with Very Wide Fracture Space	ng	ay henderson											
				100%	100%					Strata REC=100% (20.0) Strata RQD=100% (20.0)					·								
			2:06																				
			0.45																				
			2:15																				
			2:56																				
			2.00																				ĺ
			2:31																				ĺ
54.0	13.6	5.0		(5.0)	(5.0)																		
			1:45		100%																		
				10070																			
			1:54																				
			2:31																				
			3:15											5									
														2/27/01									
49.0	18.6		2:59																				
		5.0	2:39	(5.0)	(5.0)	1								NCDOT2.GDT									
			2.39	100%	100%																		
			3:25											2.GP.									
5. L														01100132.GPJ									
المر			3:29																				
			3:26											T_CORE#2									
														EC-NCDOT									
<b>044</b> .0	<b>23</b> .6		3:44										1	<u>.</u>									í –

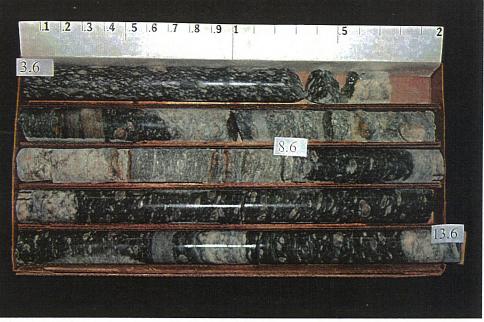
### PG 24 TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

		-,								SHEE	<u>T_2_OF</u>	2
		ID.	I-4400			СС	DUNTY Henderson		GEOLOGI	ST D.T	eague	
struct	tures on	I-26 o	ver Cle	ar Cree	ek						GROUN	D WATER (ft)
	BORING	LOCA	TION	422+	<b>O</b> 9		OFFSET 27 ft. LT	ALIGNM	ENT -L-		0 HR.	N/A
NO	RTHING	599	9991				EASTING 970621				24 HR.	N/A
DRI	LL MAC	HINE	CME	850 Tı	rack DR	ILL	METHOD 2.94 in. Trico	ne		HAMM	ER TYPE	140 lb. auto
		СОМ	PLETE	D 1/29	9/01		SURFACE WATER DEPT	<b>H</b> 0.5				
	<del></del> .		AL RUN		) ft		DRILLER W. Whichar	t				·
<u>REC</u> . (ft) %	UN RQD (ft) %	SAMP. NO.	REC.	RQD			DESCRI	ption an	D REMARKS			
(5.0)	(5.0)			<u> </u>			Continue	ed from pr	revious pag	e		
(5.0)												
00%	100%			l								
	$\left  \right $				2038.9	7		00.00.0		00.07		28.60
							Coring Terminated a (Henderson Gneiss)	t 28.60 f	eet (EL 20	JJA.97)	in Hard F	KOCK
							,					
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**ROCK PHOTOGRAPHS** 

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Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B2-C



Box 1 of 3



Box 2 of 3

## **ROCK PHOTOGRAPHS** Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400)



#### PG 25

Boring No. B2-C

Box 3 of 3



# TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

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JIE	CT NO.	8.19	52001			ID.	1-4400			COUNT	гү н	end	erson		GEOLOGIST	EET 1 OF D.Teague	
	ESCRIP			Structur	es on	<u> </u>		ar Creek							1		ID WATER (ft)
	G NO.									OFF	SET	40	ft. RT		ALIGNMENT -L-	0 HR.	N/M
	R ELEV									<u> </u>			70675		1	24 HR.	6.00
	DEPTH			<u>í</u>		HINE		850 Tra							опе НА		140 lb. auto
	STARTE	_	30/01	DIVICE				D 1/31/	<b>i</b>				ATER	_			
ELEV.	1					100111		S PER FO		1001	1	MP.		1 .			
(ft)	(ft)	0.5ft	0.5ft	0.5ft	Q	20	40	60 60		) 1		0.	мо	0	SOIL AND RO	CK DESCRIPTI	ON
(11)			0.011		1		<u> </u>	<u> </u>	1			<u>.</u>					
074.08						Grou	nd Surf	ace Elev	<u>v. 2074.</u>	08	_			<u> </u>	2074.08 Alluvial: Loose, Mois	t, Grav, Silty Fir	0.
1						• • • •		· · · ·		· · · · · ·	:			•	Medium SAND with	Gravel (A-2-4)	
2070 -	- <u>3.50</u>	7	1	5		••••			· · · · ·	•••	•		м	ŀ :	I- NOTE: Boulder enc	ountered from 2	50 to 3.50
-	È.				:1	· · · ·		· · · · ·	· · · · · · · ·	· · · · · ·	:				_ feet		
-	- 8.50				::	· · · · ·		· · · · · · · ·	· · · · ·	· · · · · ·	:			ŀ·			
2065-	-	9	9	61	]:!	· · · ·	· · · ·	· · · ·	<u>.</u>	•••			м	[] 		e, Moist. Tan a	<u>9.</u> nd Grav. 7
1	-					· · · ·		 		· · ·				ħΠ	Silty Fine to Coarse	SAND (A-2-4)	
2060 -	13.00	50/0	<u> </u>		1::			· · · ·	· · · ·	5070	•				Hard Rock- Very Slig	htly Weathered	to Fresh,
2000-	E									• • •	:				Hard to Very Hard, L Henderson Gneiss w	ight to Dark Gra	v
					•••	• • • •	• • •			• • •	•			$\geq$	Spacing. Note: Core Would N		
2055-										•••				$\gg$	Therefore, 32.30 fee		
-									· · · · ·	· · · · · ·	:			$\bigotimes$	L Strata REC≂100% (2	20.0)	
	-					• • • •		· · · · ·	· · · · ·	••••				$\otimes$	Strata RQD=98% (1	9.0)	
_∠050-	-					· · · · ·	• • •	· · · · · · · ·	· · · · ·	•••	ज्ञी 🗄	5-5			<u>}_</u>		
4	_					· · · ·	•••	· · · · · · · ·	· · · · ·	•••	•	i			-		
2045-			•			· · · · ·		· · · ·	· · · ·	· · ·	:				+		
2043-	_		}	ľ		• • • •	• • •			•••	:				ł		
1					· ·				· · · ·		·			$\bigotimes$	2041.08		33.
	-														Coring Terminated a Hard Rock (Henders		2041.08) in
1																	
1	-														- -		
4	-																
1	-																
1	-														-		
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# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

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			TR	GL	JNJ											SHEE	T 2 OF	2
		PRO	JECT N	<b>0.</b> 8	.1952001			ID.	1-4400		(	COUNTY Her	nderson		GEOL	OGIST D.		
TER (ft)		SIT	E DESCI	RIPTIC	N Dual	Struct	ures or	1 I-26 o	ver Cle	ar Cree	k				•		GROUN	WATER (ft)
N/M		во	RING NO	. В-	183	8	BORING	G LOCA		422+	10	OFFSET 4	0 ft. RT	ALIGN	MENT	-L-	0 HR.	N/M
6.00	1	co	LAR EL	EV.	2074.08		RTHING	<b>3</b> 600	032			EASTING	970675				24 HR.	6.00
b. auto		тот	AL DEP	тн з	3.0 ft	DRI	LL MA	CHINE	CME	850 Tr	ack DRIL	L METHOD	2.94 in. Tric	one		НАММ	ER TYPE	140 lb. auto
		DAT	E STAR	TED	1/30/01			СОМ	PLETE	D 1/31	/01	SURFACE \	WATER DE	РΤΗ		•		
		co	RE SIZE	NQ	2			тот	AL RUN	20.0	ft	DRILLER	W. Whicha	ard				
		ELE (ft)	V. DEPTI (ft)	H RUN	DRILL RATE (Min./ft)	REC. (ft) %	UN RQD (ft) %	I SAMP. NO.	REC.	RQD			DESC	RIPTION	AND REMA	ARKS	<u>,</u>	
			-			<u>%</u>	<u>%</u>		%	8			Contin	ued from	nrevious	n209		
		2041	<u>.  </u>	<u>-</u>	·							Çoring T	erminated son Gneiss	at 33.00	) feet (E	L 2041.08	) in Hard F	lock
	:											(Henders	son Gneiss	5)				
	4																	
	- 																	
		÷																
	1	127/0																
		07 2																
		12.GI																
		00																
		N N																
		32.GF																
		1001																
		5 01																
		ЦЩ.																
		20																
		TEC-NCDOT_CORE#2 01100132.GPJ NCDOT2.GDT 2/27/01																
		U L L L L																
33.00		<u>۲</u> ۱	l		I	I	I	I	I	1								

PROJ	ECT NO	<b>).</b> 8.	1952001			ID.	<b>I-</b> 4400		COUNTY Hen	Iderson		GEOLOGI	ST D.Te	eague	
SITE I	DESCR	PTIO	N Dual	Struct	ures or	1 <b>I-</b> 26 c	ver Cle	ar Creel	•					GROUN	ID WATER
BORI	NG NC	)	B-183	BOR		LOCAT	ION	422+10	OFFSET 40	0 ft. RT	ALIGNM	ENT -L-		0 HR.	N/M
COLL	AR ELE	V.	2074.08	B It NOF	RTHING	600	032		EASTING	970675				24 HR.	6.00
ΤΟΤΑ	L DEPT	ΉЗ	3.0 ft	DRI	LL MAG	CHINE	CME	850 Tra		2.94 in. Tri	icone		HAMME	RTYPE	140 lb. au
DATE	START	ED	1/30/01			СОМ	PLETE	D 1/31/	SURFACE V						
CORE		NQ2			JN	<u> </u>		20.0 f	DRILLER	W. Which	hard				
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min./ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC.	RQD		DES	CRIPTION AN	ID REMARKS	3		
2061.1	13.0									Beç	gin Coring @	) 2061.08 ft			
		5.0	3:35	(5.0)	(4.7)		100%	98%	Hard Roo Hard, Lig	ck-Very S tht to Dar	Slightly We k Gray Her	athered to	) Fresh, neiss wi	Hard to th Close	Very e to
				100%	94%				Wide Fra Note: Co	icture Spa re Would	Slightly We k Gray Her acing. I Not Break 0 feet left in	below 32	.30 feet.	Therefo	ore,
			2:51									n hole.			
									Strata RE Strata RC	_C=100% 2D=98%	(19.6)				
			2:57												
			3:10												
			0.10												
			3:07												
2056.1	18.0	5.0		(4.0)	(4.9)										
)			2:50	80%	98%										
~			2:56												
			2.00												
			3:01												
			2:51												
			2:45												
.051. <u>1</u>	23.0	5.0	2.110	(5.0)	(5.0)										
		5.0	2:51												
				100%	100%	RS-5									
			2:16												
			2:41												
			<b>_</b> (T)												
			3:25												
	<u>28.0</u>														
2046 1	28.0		3:17												
		5.0	4:28	(5.0)	(5.0)										
			4.20	100%	100%										
			4:24												
/			4:10												
			4.05												
			4:25												
	1			1	I	1		1 I							

#### PG 27

# TRIGON ENGINEERING CONSULTANTS, INC. CORE BORING REPORT

**ROCK PHOTOGRAPHS** 

Dual Structures on I-26 over Clear Creek NCDOT Project 8.1952001 (I-4400) Boring No. B2-B



Box 1 of 2



Box 2 of 2

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-320

#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG



PROJE	CT NO.	8.19	52001			ID. 1-4	4400		C	OUNTY	Hend	lerson	I	GEOLOGIST D.	Feague	
SITE DE	ESCRIP	TION	Dual S	Structur	es on	- I-26 ove	r Clear	Creek							GROUND W	ATER (ft)
BORING	G NOB-	184		вс	RING	LOCAT	ION 4	22+88		OFFSI	ET 81	ft. LT		ALIGNMENT L-	0 HR.	Dry
COLLA			1.65 ft	NORT	HING	60002	24			EASTIN	<b>IG</b> 97	0531			24 HR.	Dry
TOTAL						HINE	CME 55	ATV		. METH			ID H	HSA HAMM		) lb. manua
DATE S			10/01		_		ETED		1	SURF						
	DEPTH		ow cou	JNT			BLOWS				SAMP.	<b>V</b> /	Ĺ			
(ft)	(ft)	0.5ft	0.5ft	0.5ft	٩	20	40	60	80	100	NO.	мо	0 G		DESCRIPTION	
Ī																
						•		_		-						
2121.65				·		Ground	<u>I Surfac</u>	<u>e El ev</u> : 	2121.6	<u> </u>	<del></del>		F	2121.65 - Roadway Embankment:	Loose to Dense,	0.0 Gray,
2120-	- 3.50					· · · ·	· · · ·	· · · ·	· · · ·	· · ·				- Silty Fine to Medium SA	ND with Gravel (A-	·2-4)
Į		3	3	2	∳	5			· · · ·	· · · · · ·		м	Ŀŀ	1		
2115	-				:					· · · · · ·			Ľ			
+	8.50	2	1	3	: <u> </u>					· · ·		м	Ľ	₽ ₽ ₽		
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2110-	- 13.50				:					• • •			Ŀ			
ļ	13.30	5	5	3		8						м	Ľ	ł		
2105-	-					$\sum$	• • • •						Ŀ	<b>}</b>		
	18.50	12	10	8		$\cdot \setminus \cdot \cdot$						м	Ŀ	♣ ₽		
$\sim 1$	_	12	10	°		. 18	• • • •							4 4		
100-	-												Ŀ	*_ *_		
Į	23.50	6	5	6								м	Ŀ	+ +		
2095	-												Ľ	+ +		
2000	28.50			1.5									Ŀ	• • •		
ļ	-	5	35	15		••••		<b>9</b> 50				M	F	4- #-		
2090	-					· · · · ·	/			•••				<u>↓</u>		
1	33.50	5	5	5		•10		· · · · ·		•••		м	F			
2085	-				[::]	[				•••			F	↓ ↓		
2003	38.50				::/	· · · · ·	· · · · ·			•••			F	↓ ▶		
Ī	-	2	3	3	•	6	· · · · ·	· · · · ·	· · · · ·	· · · · · ·		M	F			
2080-	-				:	· · · · ·				· · · · · ·		м		- Roadway Embankment:	Medium Stiff Moi	42.0
Ī	43.50	3	2	3		· · · · · · · ·		• • • • • • • • •		$   \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot $	SS-9	15.8	E	- Brown and Gray, Fine to (A-6)	Medium Sandy C	LAY
2075	<u> </u>				:[	••••	· · · · ·		· · · ·	•••			F	-2074.65		47.0
2013	48.50					• • • •	]:::			· · · ·				Residual: Very Stiff, Mo to Medium Sandy SILT (	ist, Red and Gray, A-4)	
J	-	18	10	20		::::	30	· · · · ·	· · · · ·	$\cdot$ $\cdot$ $\cdot$	SS-10	19.3				
2070	-					· · · · ·	<u>  · · ·</u>	· · · ·	· · · ·	· · · ·			<b>C</b> TT	2070.15 Hard Weathered Rock-O	Gray Henderson Gr	51.5 neiss
ŧ	53.50 54.50					· · · · · · · ·	· · · ·	· · · · · · · ·	· · · · ·	50/:1				2067.15		54.5
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PROJE	CT NO.	8.19	52001			ID. I	-4400			[
SITE D	ESCRIP	TION	Dual S	Structur	es on	I-26 ov	/er Cle	ar Cree	k	
BORIN	g no. E	3-185		вс	RING		TION	422+8	2	
COLLA		. 212	1.92 ft	NORT	HING	600	049			
TOTAL	DEPTH	51.2	0 ft	DRILL	. MAC	HINE	CME	55 AT\	/  1	DRIL
DATE	STARTE	D 1/9	9/01	1		COM	LETE	D 1/9/0	)1	
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2105-	- 18.50					::\`:	· · ·			•••
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2100-	- 23.50					:/.::	· · ·		•••	: :
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2095-	- 28.50					1:::	· · ·		•••	•••
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2090 -	- 33.50					: \ : :			••••	: :
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2085-	- 38.50					::::	• • •		•••	::
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2080 -	43.50						· · ·			::
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2075	- 48.50					· · · · ·	· · · · · ·	· · · ·		: :
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#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

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С	DUNTY	Hend	erson			GEOL			Feague		
									GROUN	D WATER	: (ft)
		ET 29			ALIGN	MENT	- L-		0 HR.	Dr	У,
		<b>NG</b> 97							24 HR.	Dr	
ILL	METH		25 in					HAMM	ER TYPE	<b>140 lb.</b> π	anual
	SURF	ACE W	ATER		тн						
0	100	SAMP. NO.	мо	0		SOI	L AND	ROCK	DESCRIPTI	ON	
l'										ŗ	
<u>.92</u> 	2				2121.92	Roadway	Emba	nkment:	Stiff to Very	Stiff,	<u>0.0C</u>
 				L	L	Moist, Gra Clayey Sll	av-Tar	h-Red, Fi	ne to Mediun	n Sandy	
· ·	· · ·		м	L	-	Note: Bou			red From 33.	50 to 37.00	
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	• •			611					<u>th Gravel (A-</u> Gray Henders		
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#### TRIGON ENGINEERING CONSULTANTS, INC. BORING LOG

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PROJI	ECT NO.	8.19	52001		11	D. I-4400		C	OUNTY	Hend	lerson		GEOLOGIST	ET 1 OF D.Teague	
SITE C	DESCRIP	TION	Dual \$	Structur	es on I-2	26 over Clear	Creek							GROUN	ID WATER (ft)
BORIN	IG NO.	B-186		BC	RING L	OCATION 4	22+95		OFFS	<b>ET</b> 39	ft. RT		ALIGNMENT -L-	0 HR.	Dry
	AR ELEV			NORT	HING	600099			EAST	ING 9	70624	4	1	24 HR.	
				-		NE CME 5	5 471/	ו וואם	METH						140 lb. manua
															140 Ib. manua
	STARTE	·	9/01			OMPLETED		-	SURF	ACE W					
ELEV.	DEPTH				,	BLOWS			100	SAMP.		ō	SOIL AND ROO	K DESCRIPT	ION
(ft)	(ft)	0.5ft	0.5ft	0.5ft	ĭ	20 40	60 I	80 1	100	NO.	/мо	G	1		
						Ground Surfac		2120.00	<b>.</b>						
<u>120.90</u> 2120-		·		-	· · · ·		· · · · ·	<u>2120.90</u>	·			ÈF.	2120.90 Roadway Embankme	nt: Loose to De	ense, Moist,
2120	+				•••		• • • •	• • • •	•••			H.	Gray, Silty Fine to Me (A-2-4)	dium SAND wi	th Gravel
	+ <u>3.50</u> †	4	7	30			• • • •		••••		м	Ęŀ			
2115-	‡						••••	· · · · ·	· · · · · ·			Þ.	<u>}</u>		
•	+ 8.50				· · ·	· /· · · · · ·	••••	· · · ·	• • •			Ľ	t		
	<u>f 0.00</u>	5	5	4	:::		• • • •		• • •		м	F1	1		
2110-	+				:::``	<u>_</u>	••••	· · · · ·	••••			FI:	F		
•	+ 13.50					:	•••• •••	· · · · · · · ·	· · · · · ·				1		
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2105-	Ł						• • • •		• • •			<u> </u>  1			
	T 18.50						••••		•••			E.			
	† +	7	6	6	:: <b>;</b>	/ 1 <sup>2</sup>	••••	· · · ·	· · ·		м	타	+		
)100-	ŧ						••••		•••			ŀ	2098.90		22.0
	23.50						• • • •					FN	Roadway Embankme Sandy Silty CLAY (A-	nt: Stiff, Moist,	Red, Fine
	Ŧ	3	5	5	: : <b>•</b> 1	••••••••••••••••••••••••••••••••••••••	· · · · ·	· · · · ·	· · · ·	SS-5	28.1	EN		-0)	
2095-	+						• • • •	• • • •	•••			LN	- 2093.40		27.5
	28.50				<del>.</del>	• • • • • • •	• • • •						Soft Weathered Rock	-Gray Henders	
	+	50/.3				· · · · · · · ·	• • • •		50/.3 <b></b>			NNI	- -		
2090-	Ŧ				· · · ·	· · · · · · · ·	••••	· · · · · · · ·	::			КW	<u> -</u>		
	+ <u>33.50</u>	21	28	72/.1			••••	· · · ·	::			W			
	Ł	21	20	12.1	• • • •		• • • •	• • • •	100/.6			W/			
2085-	Ŧ				••••	· · · · · · · · ·	• • • •	••••					-		
•	38.50	100/.5					• • • •	• • • •	· · ]				2081.90		39.0
	ŧ								1007.5-				Boring Terminated at Soft Weathered Rock	39.00 feet (EL -Henderson Gr	2081.90) in 1eiss
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			Clay (%)	26	22	20	5	19	5	24	10	40			
					5	5				5	-	4			
$\bigcirc$			Silt (%)	18	19	46	4	16	5	21	21	19	23		
			Fine Sand (%)	33	36	33	25	34	17	26	34	21	38	INC	
		n Results	Coarse Sand (Ret. #60) (%)	23	23	1	66	31	76	29	35	20	31	TRIGON ENGINEERING CONSULTANTS, INC. RALEIGH, NORTH CAROLINA Trigon Job Number: 01100132 Page: 1 of 2 Page: 1 of 2 1 (62)23 ar Creek rolina	
		Gradation Results	Pass #270 Sieve	44	41	66	6	35	L	45	31	59	31	G CONSU 3 CONSU 3 CONSU 3 CONSU 3 CONSU	
			Pass #200 Sieve	51	45	76	13	41	6	50	36	63	38	I ENGINEERING CONSULTANT RALEIGH, NORTH CAROLINA Trigon Job Number: 01100132 Page: 1 of 2 k	
23 reek a	TA		Pass #40 Sieve	86	92	100	44	80	33	81	77	88	82	ON ENGINE RALEIGI Page: Jo Page: 23 Ceek	-
State Project No. 8.1952001 ederal Project No. NHF-26-1-(62)23 al Structures on I-26 over Clear Cre Henderson County, North Carolina	<b>FEST DA</b>		Pass #10 Sieve	100	100	100	58	100	66	100	100	100	100	TRIGC TRIGC State Project No. 8.1952001 Federal Project No. NHF-26-1-(62)23 al Structures on I-26 over Clear Cre Henderson County, North Carolina	
State Project No. 8.1952001 ral Project No. NHF-26-1-( tructures on I-26 over Clean derson County, North Carc	ATORY	imits	Ъ.I.	đ	6	ďN	NP	23	NP	12	ЧŅ	39	NP	T State Project No. 8.1952001 sral Project No. NHF-26-1-( tructures on I-26 over Clean derson County, North Carc	     
ject N ct No. on I-2	ABOR	Atterberg Limits	P.L.	dN	25	ЧN	NP	25	NP	15	NP	29	ЧŊ	ject N on I-2 ounty,	-
te Pro Projectures ctures	Y OF L	Atte	L.L.	47	34	37	23	48	30	27	36	68	31	Projectures Y OF L	1 J
State Project No. 8.1952001 Federal Project No. NHF-26-1-(62)23 Dual Structures on I-26 over Clear Creek Henderson County, North Carolina	SUMMARY OF LABORATORY TEST DATA		N- Value (bpi)**	6	2	7	32	10	70	5	30	10	11.	TRIGON F R T T S R T R R R R T T R R R R R R R R	
Π			AASHTO Class (Group Index)	A-4(0)	A-4(1)	A-4(1)	A-1-b(0)	A-7-6(5)	A-1-b(0)	A-6(3)	A-4(0)	A-7-6(23)	A-4(0)		
• • •			Natural Moisture Content (%)	24	42	36	B	18	1	16	19	28	17	586)	
			Sample No.*	SS-6	SS-11	SS-11	SS-12	SS-3	SS-12	SS-9	SS-10	SS-5	SS-3	ASTM-D-1 it of 1 foot	
· · · · · · · · · · · · · · · · · · ·			Sample Depth (ft)	28.5-30.0	53.5-55.0	53.5-55.0	58.5-60.0	13.5-15.0	58.5-60.0	43.5-45.0	48.5-50.0	23.5-25.0	13.5-15.0	* SS = Split-Spoon Sample (ASTM-D-1586) ** bpi = Blows per increment of 1 foot *** S = Bulk Sample NP Non Plastic	
			Boring No.	EB1-A	EB1-A	EB1-B	EB1-B	EB1-C	EB1-C	EB2-A	EB2-A	EB2-B	EB2-C	* SS = Split-Spoo ** bpi = Blows pe *** S = Bulk Sam NP Non Plastic	

_	the second second second second second second second second second second second second second second second s						 		 
	Clay (%)	18	24	7	11	6			
	Silt (%)	21	18	6	4	14			
	Fine Sand (%)	40	29	42	32	61			
Gradation Results	Coarse Sand (Ret. #60) (%)	21	29	42	53	6			
Gradatio	Pass #270 Sieve	39	42	16	15	20			
	Pass #200 Sieve	48	47	20	23	31			- -
	Pass #40 Sieve	88	80	81	57	66			
	Pass #10 Sieve	100	100	100	74	100			
mits	P.I.	ΝЪ	NP	NP	NP	NP			
Atterberg Limits	P.L.	NP	NP	ďŊ	NP	NP			
Atte	L.L.	39	44	30	30	42			
	N- Value (bpi)**	13	14	2	10	1			
	AASHTO Class (Group Index)	A-4(0)	A-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)			
	Natural Moisture Content (%)	31	19	1	1	•			
	Sample No.*	SS-6	SS-1	SS-2	SS-1	SS-2			
	Sample Depth (ft)	28.5-30.0	3.5-5.0	8.5-10.0	3.5-5.0	8.5-10.0			
-	Boring No.	EB2-C	B1-A	B1-A	B1-B	B2-A		-	

\* SS = Split-Spoon Sample (ASTM-D-1586) \*\* bpi = Blows per increment of 1 foot \*\*\* S = Bulk Sample NP -- Non Plastic

TRIGON ENGINEERING CONSULTANTS, INC. RALEIGH, NORTH CAROLINA Trigon Job Number:01100132 Page: 2 of 2

#### State Project No. 8.1952001 Federal Project No. NHF-26-1-(62)23 Dual Structures on I-26 over Clear Creek Henderson County, North Carolina

#### LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

Sample Number	Boring Number	Depth (ft)	Rock Type	Run RQD (%)	Length (ft)	Diameter (Inches)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)
RS-1	B1-A	25.5-25.8	Henderson Gneiss	98	0.3	2.03	159.5	15,177
RS-2	B1-B	11.1-11.4	Henderson Gneiss	100	0.3	2.03	154.7	16,416
RS-3	B1-C	21.0-21.3	Henderson Gneiss	64	0.3	2.03	158.1	21,330
RS-4	B2-A	18.2-18.5	Henderson Gneiss	98	0.3	2.03	158.6	16,726
RS-5	B2-B	24.0-24.3	Henderson Gneiss	100	0.3	2.03	159.5	14,105
RS-6	B2-C	7.6-7.9	Henderson Gneiss	60	0.3	2.03	160.5	15,222
		-						

TRIGON ENGINEERING CONSULTANTS, INC. RALEIGH, NORTH CAROLINA Trigon Job Number: <u>01100132</u> Page: <u>1 of 1</u>



#### **CONTENTS** SHEET NO.

5

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

4400 REFERENCE

32 42. Õ PROJEC

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION I-26 FROM US 64 (EXIT 49) TO US 25 BUSINESS (EXIT 44)

SITE DESCRIPTION **RETAINING WALL RW7** VERTICAL ABUTMENT WALL FOR CLEAR CREEK RD **BRIDGE OVER I-26 (440217)** 

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL
N.C.	34232	1	5

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNIKG AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEORED OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOL MOISTURE CONDITIONS MOLATED IN THE SUBSURFACE RELIEVELS OR SOL MOISTURE CONDITIONS TIGCATED 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 OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBJURACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY IMISELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOM THE ACUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. 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. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. 2.

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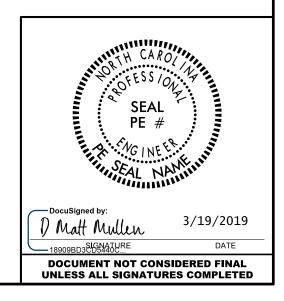
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SUBMITTED BY J.C. JUHNE



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

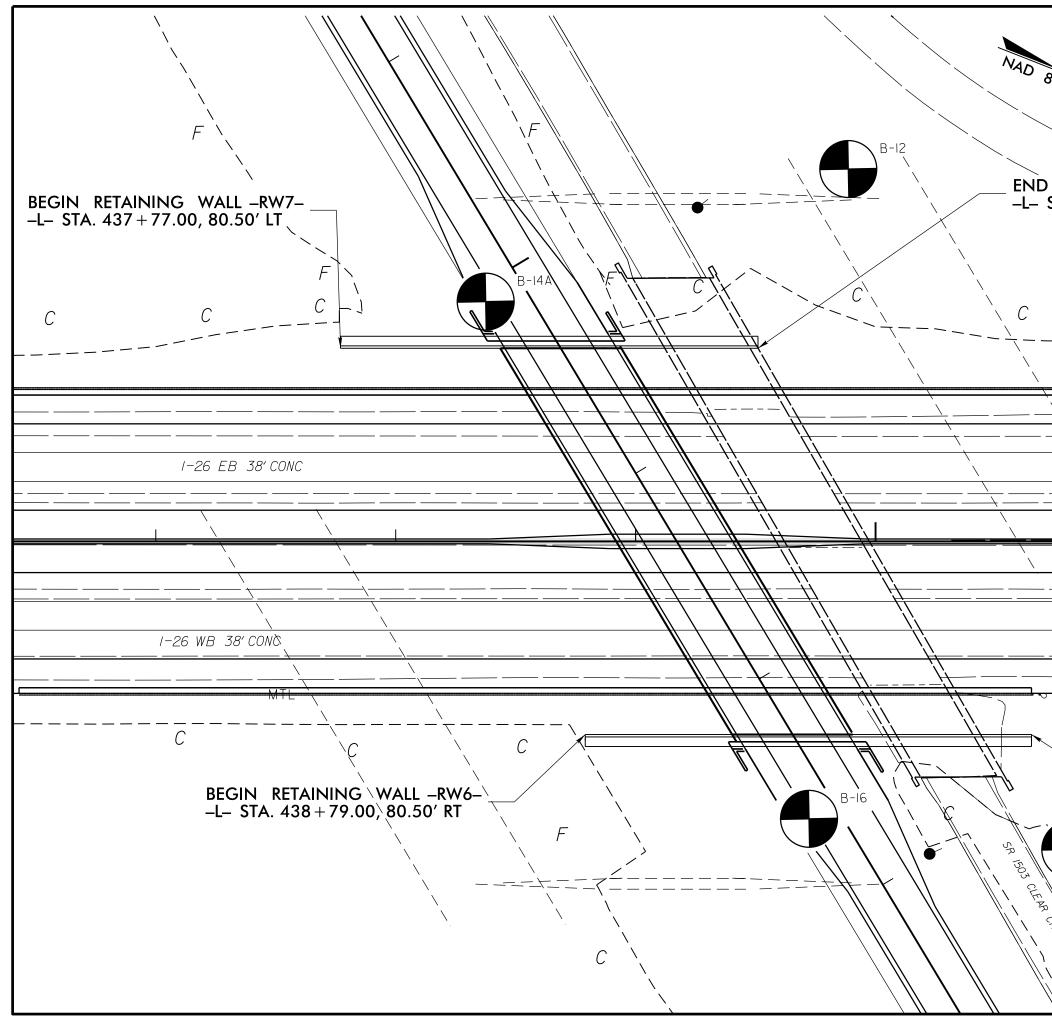
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586), SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AUUIFER - A WATER BEARING FORMATION OR STRATA.
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.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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 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	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS		CRYSTALLINE	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
ULASS. ( \$ 33% PASSINU *200) ( \$ 33% PASSINU *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	
GROUP         A-1         A-3         A-2         A-4         A-5         A-6         A-7         A-1, A-2         A-4, A-5           CLASS.         A-1-a         A-1-b         A-2-4         A-2-6         A-2-7          A-7         A-1, A-2         A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
A-//6	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL POCCOCCOCC	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
X PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX *40 30 MX 50 MX 51 MN GRANULAR CLAY MUCK, SOILS CONC. PEAT	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 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS <u>SOILS</u> <u>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 STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING #40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% 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
LL – – 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR HICH Y	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.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
	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
UISUAL TYPES STONE EPACE	✓ 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.
DE MAIDE GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	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 UNSUITAB	$\underline{\nabla}$ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
AS SUBURAUE		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 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
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	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 LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A	NT	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT OF AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) 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 ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 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		SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTTT ALLUVIAL SOIL BOUNDARY A PIEZUMETER - SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
HARD 30 > 4 TEXTURE OR GRAIN SIZE		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 2 FEET OF	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	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNDERCUT UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE 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 0.005	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	CLCLAY MODMODERATELY $\gamma$ -UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ -DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
		SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <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	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	FRAC FRACTURED, FRACTURES     TCR - TRICONE REFUSAL     RT - RECOMPACTED TRIAXIAL       FRAGS FRAGMENTS     w - MOISTURE CONTENT     CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
	HI HIGHLY V - VERY RATIO	TERM         SPACING         TERM         THICKNESS	BENCH MARK: N/A ELEVATIONS DERIVED FROM DTM
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: N/A 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	X 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		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
ATTAIN OPTIMUM MOISTURE	X CME-55	THINLY LAMINATED < 0.008 FEET	
PLASTICITY			
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	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		
HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR		CRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROPE.	
		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HOUR IERS SUCH HS LIGHT, DHAN, STREHKED, ETC. MRE USED TU DESCRIDE HEPEAKANLE.		EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

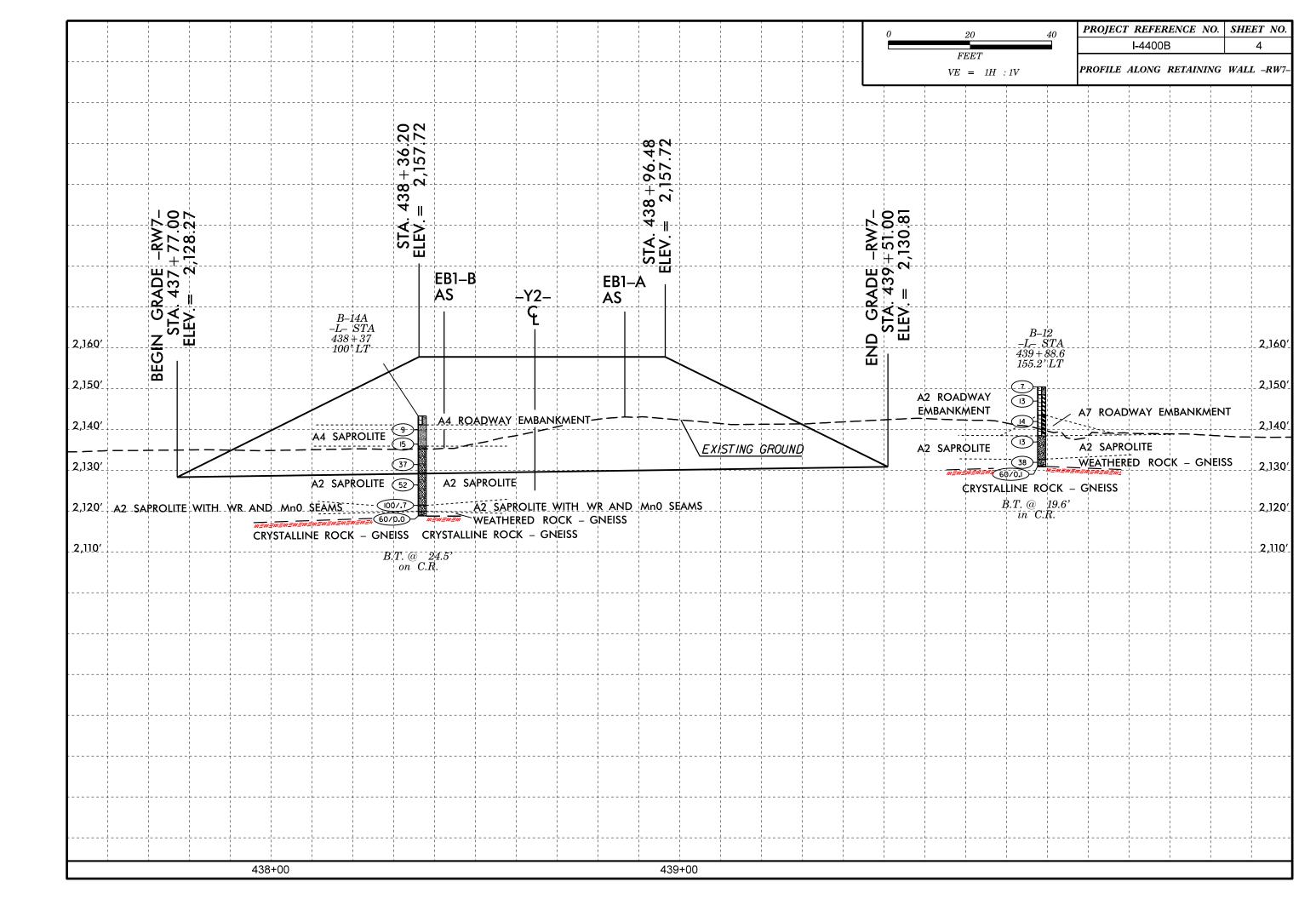
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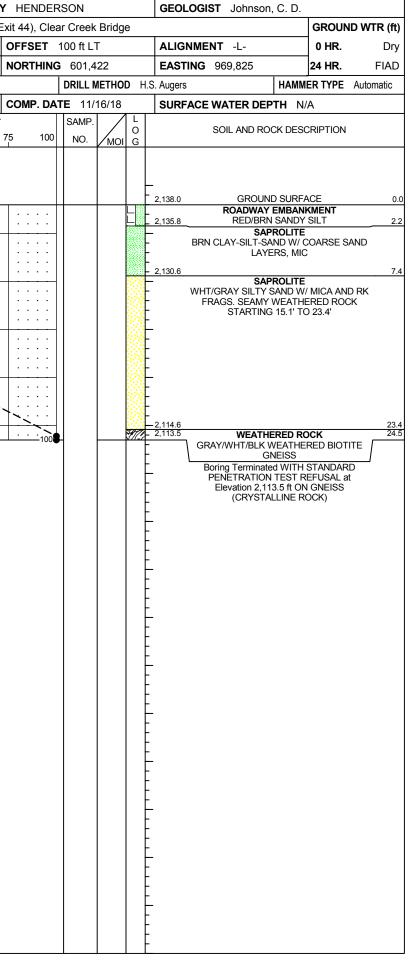
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## GEOTECHNICAL BORING REPORT BORE LOG

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SITE	DESCR	RIPTION	<b>I</b> I-26	from	US 64	(Exit 49)	to US 25	Business	, ,							VTR (ft)	SITE	E DESCR	IPTION	<b>I</b> I-26	from	US 64	(Exit 49) to	o US 25 Bi	usiness (Ex
BOR	NG NO	. B-12	2		S	TATION	439+88.	6	OFFSET	155.2 ft	LT		ALIG	IMENT -L-	0 HR.	Dry	BOF	ring no	. B-14	A		SI	ATION 4	38+37	0
COLI	AR ELI	<b>EV.</b> 2,	150.4	ft	Т	OTAL DE	<b>PTH</b> 19	.6 ft	NORTHING	<b>G</b> 601,5	542		EAST	<b>NG</b> 969,718	24 HR.	Dry	COL	LAR EL	<b>EV.</b> 2,	138.0	ft	т	DTAL DEP	<b>TH</b> 24.5 f	it 🛛 🖡
DRILL	. RIG/HA	MMER E	FF./DA	TE Fa	&R2175	CME-55	88% 02/11/	2017		DRILL I	METHC	DD ⊦	I.S. Augers	HAN	IMER TYPE Au	tomatic	DRIL	L RIG/HA	MMER E	FF./DA	TE AF	FO6744	CME - 45C 9	2% 07/31/20	)17
DRIL	LER S	. Davis	;		S	TART DA	<b>TE</b> 12/1	2/17	COMP. DA	TE 12/	12/17	,	SURF	ACE WATER DEPTH	N/A		DRI	LLER C	offey, .	Jr., C.		ST	ART DAT	E 11/16/1	18 (
ELEV	DRIVE	DEPTH		w co				VS PER FOO	л т	SAMP.		L					ELEV	, DRIVE	DEPTH		OW CO				PER FOOT
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		ŧ				<u>;</u> : :			· · · · · ·			Ľ	2,143.4	Gray-Brown, Fine San		7.0			1	5	8	7	15		
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#### SHEET 5



#### **CONTENTS**

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SHEET NO. 4400 

REFERENCE

**DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE

## STATE OF NORTH CAROLINA

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

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION I-26 FROM US64 (EXIT 49) TO US25 BUSINESS (EXIT 44)

SITE DESCRIPTION **RETAINING WALL RW12** 

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34232	1	8

#### **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 REVIEWED OR INSPECTED IN RALEICH 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 SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOL 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OSESURFACE MATER AND THE SUBSURFACE RONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WASTER LEVELS OR SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

- NOTES: I. 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. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. 2.

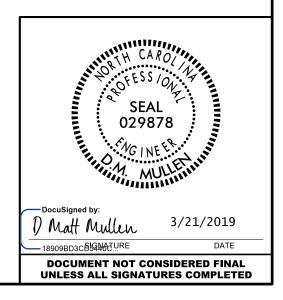
PERSONNEL

C.D. JOHNSON

D.O. CHEEK

C.J. COFFEY

INVESTIGATED BY \_\_\_\_\_. MULLEN DRAWN BY \_\_\_\_\_\_. MULLEN CHECKED BY \_\_\_\_\_\_. C. KUHNE SUBMITTED BY J.C. KUHNE



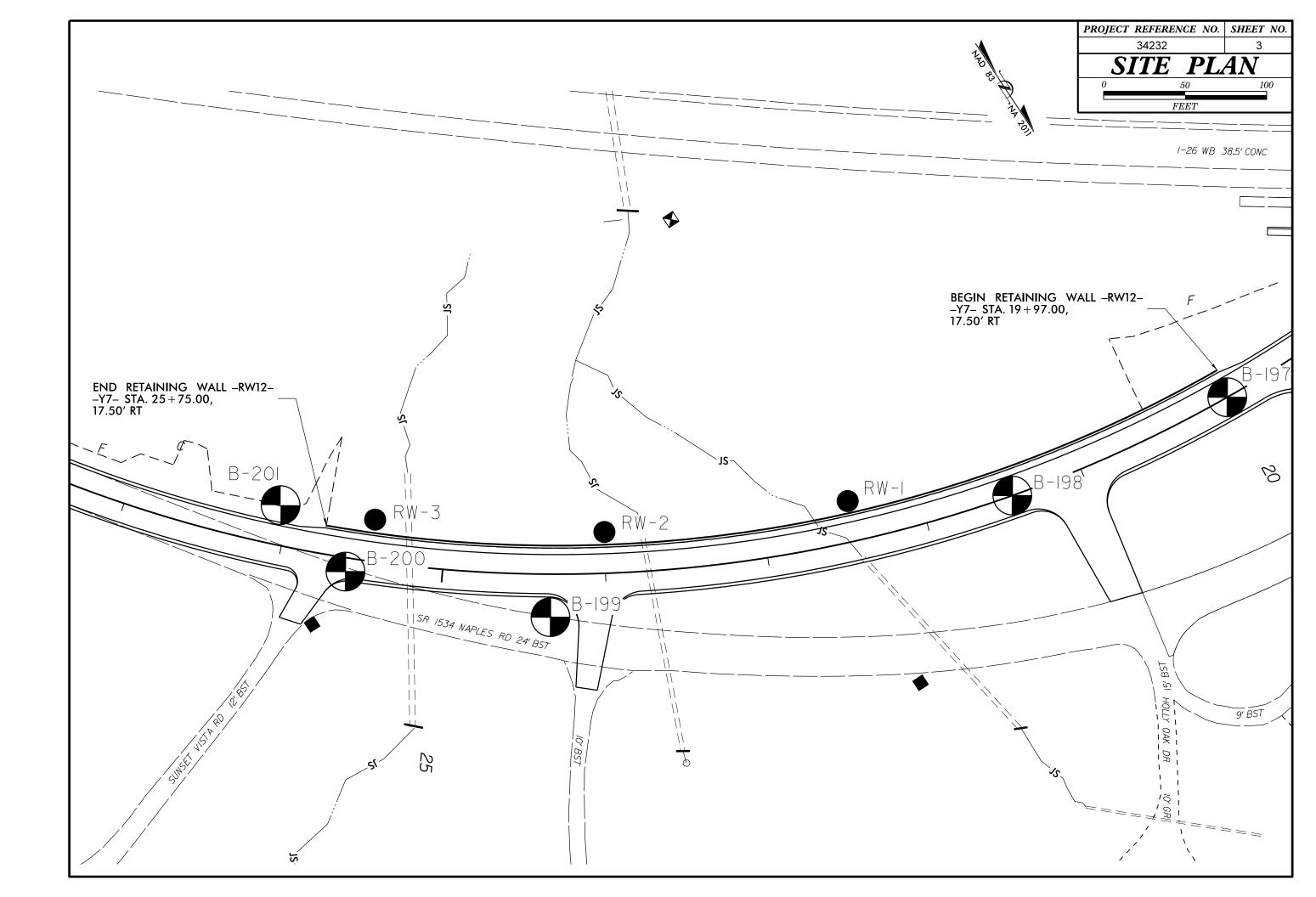
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

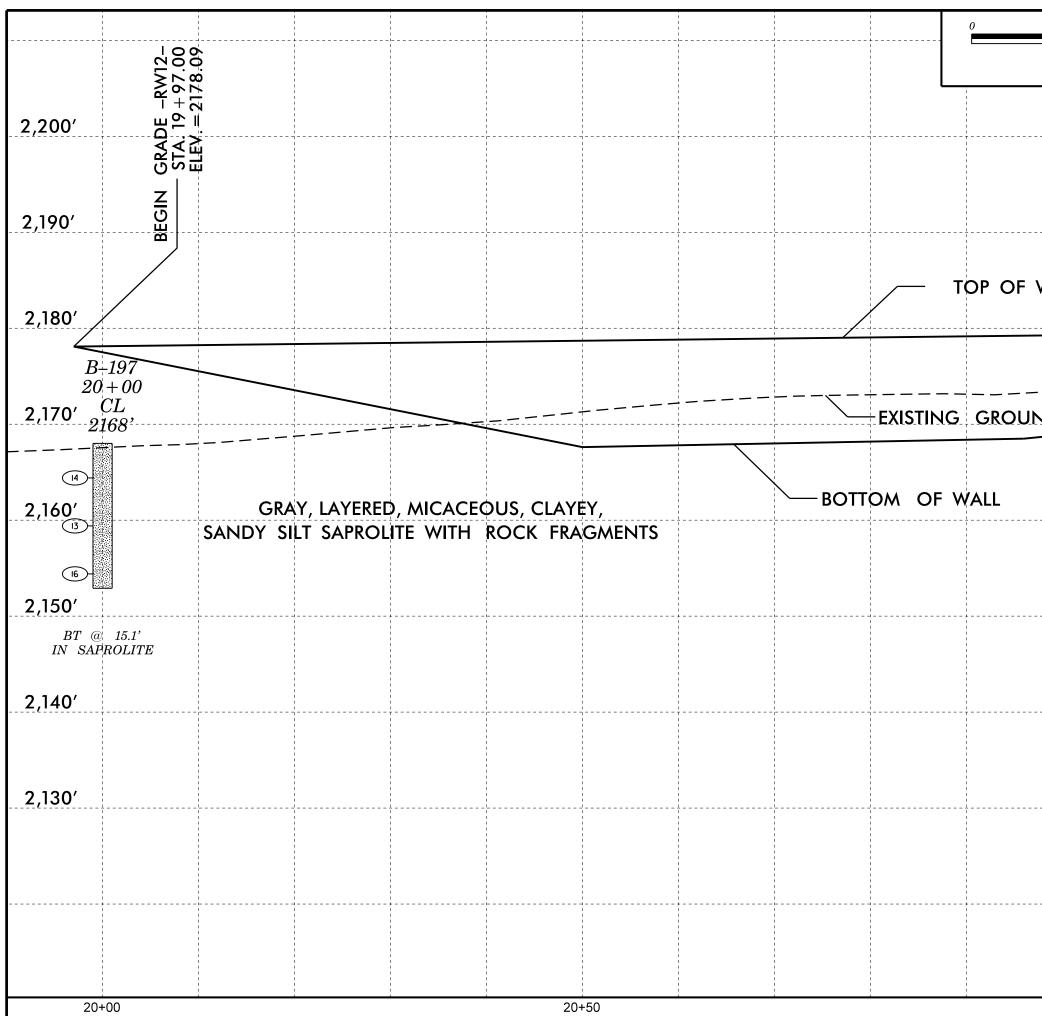
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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. SPT REFUSAL IS PERTRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.
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.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	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 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	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	MINERALOGICAL COMPOSITION	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 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.	NOLK CHY CONTRACT, CREISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6 A-7	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL DODOG DODOG	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 GRANULAR SILT-	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
•40 30 MX 50 MX 51 MN SOILS SOILS SOILS SOILS	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 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 SOULS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% 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,	HORIZONTAL.
LL — — — 419 MX 41 MN 449 MX 41 MN 449 MX 41 MN 449 MX 41 MN LITTLE OR HIGHLY	HIGHLY ORGANIC $3 - 10\%$ $12 - 20\%$ Some $20 - 30\%$ HIGHLY ORGANIC> 10\%> 20%HIGHLY35% 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.
GROUP INDEX         Ø         Ø         4         MX         8         MX         12         MX         16         MX         MODERATE ORGANIC         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 SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STORE FRAGS. FINE STITY OF CLAYEY STITY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN. RATING EVELLENT TO COOD EATE TO POOP FAIR TO POOP UNCLITARIE	$\underline{\bigtriangledown}$ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
AS SUBGRADE P1 0F A-7-5 SUBGROUP IS ≤ LL - 30 ;P1 0F A-7-6 SUBGROUP IS > LL - 30	- O-MA- Spring or seep	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES CLUNK SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONFIRCTNESS OF PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
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 LUUSE 4 IU 10 MEDIUM DENSE 10 TO 30 N/A		TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT OLGER BORING CONE PENETROMETER TEST	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           VERY SOFT         < 2	INFERRED SOIL BOUNDARY - CORE BORING • SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5		VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE 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
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - TA UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REOUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK. <u>SILL</u> - 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	IXX ONDERCOT IX UNSUITABLE WASTE IX ACCEPTABLE, BUT NOT TO BE	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
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP'S FEEL OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE 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           BT - BORING TERMINATED         MICA MICACEOUS         WEA WEATHERED	BY MODERATE BLOWS.	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
SIZE IN. 12 3	CLCLAY MODMODERATELY $\gamma$ -UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{\rm d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	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>	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST         SAP SAPROLITIC         S - BULK           e - VOID RATIO         SD SAND, SANDY         SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH	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	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 SEMISOLID; REOUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	BENCH MARK: N/A ELEVATIONS DERIVED FROM DTM
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: N/A 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	
	X CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.03 - 0.16 FEET           VERY CLOSE         LESS THAN 0.16 FEET         THICKLY LAMINATED         0.008 - 0.03 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	■	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC         Ø-5         VERY LOW           SLIGHTLY PLASTIC         6-15         SLIGHT	VANE SHEAR TEST	FRIABLE CENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC         16-25         MEDIUM           HIGHLY PLASTIC         26 OR MORE         HIGH	CASING W/ ADVANCER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
		BREAKS EASILY WHEN HIT WITH HAMMER.	
		INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

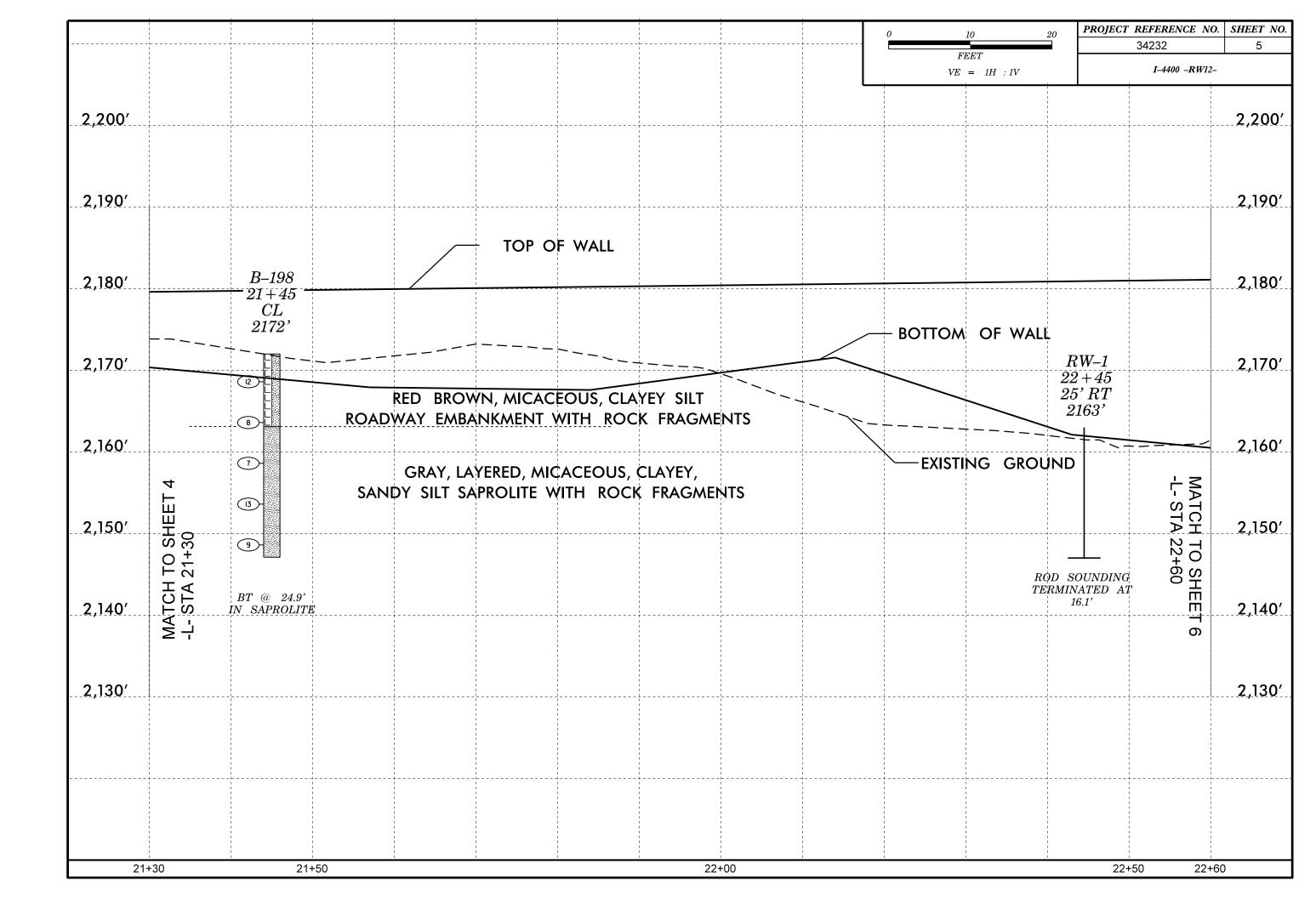
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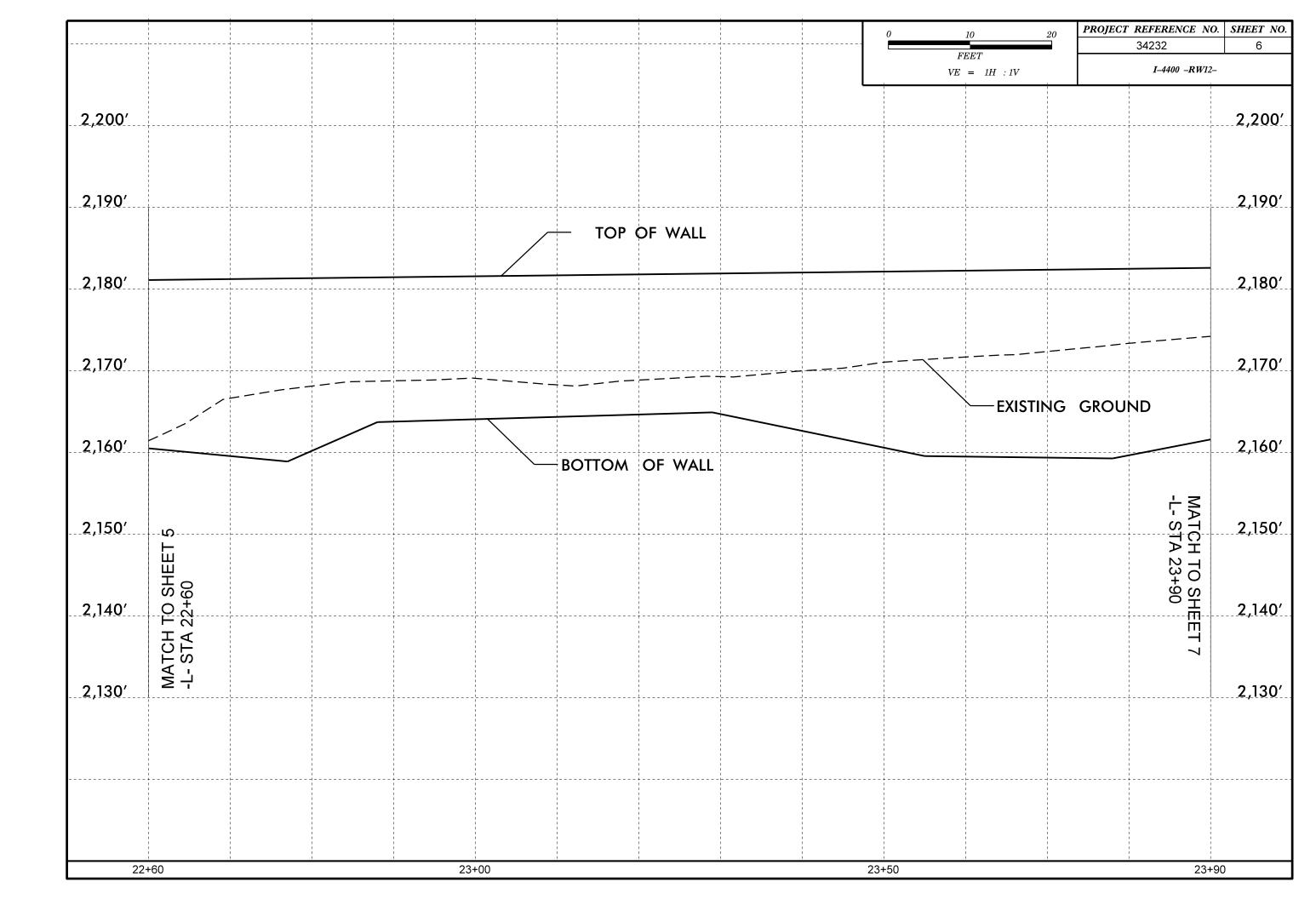


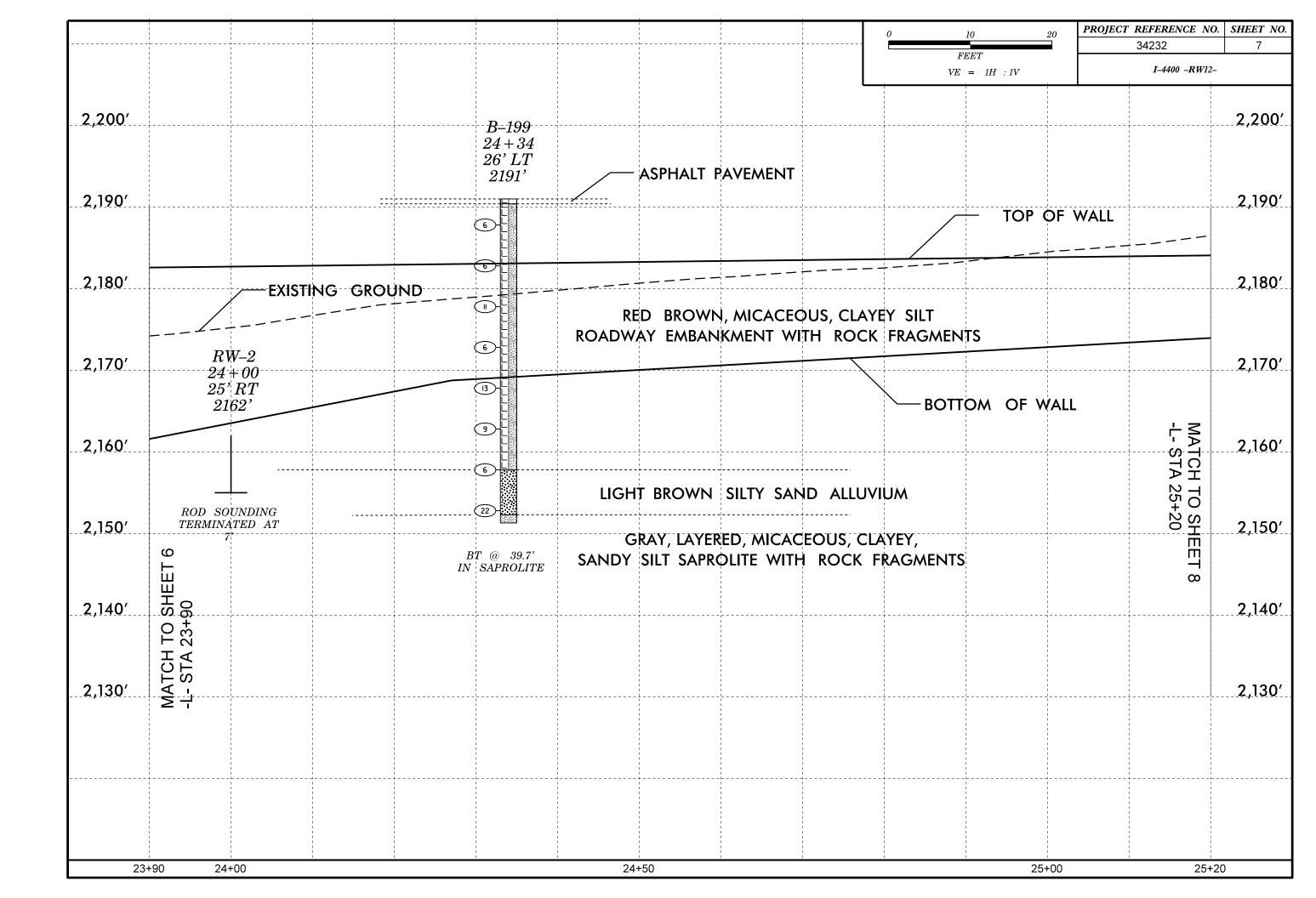


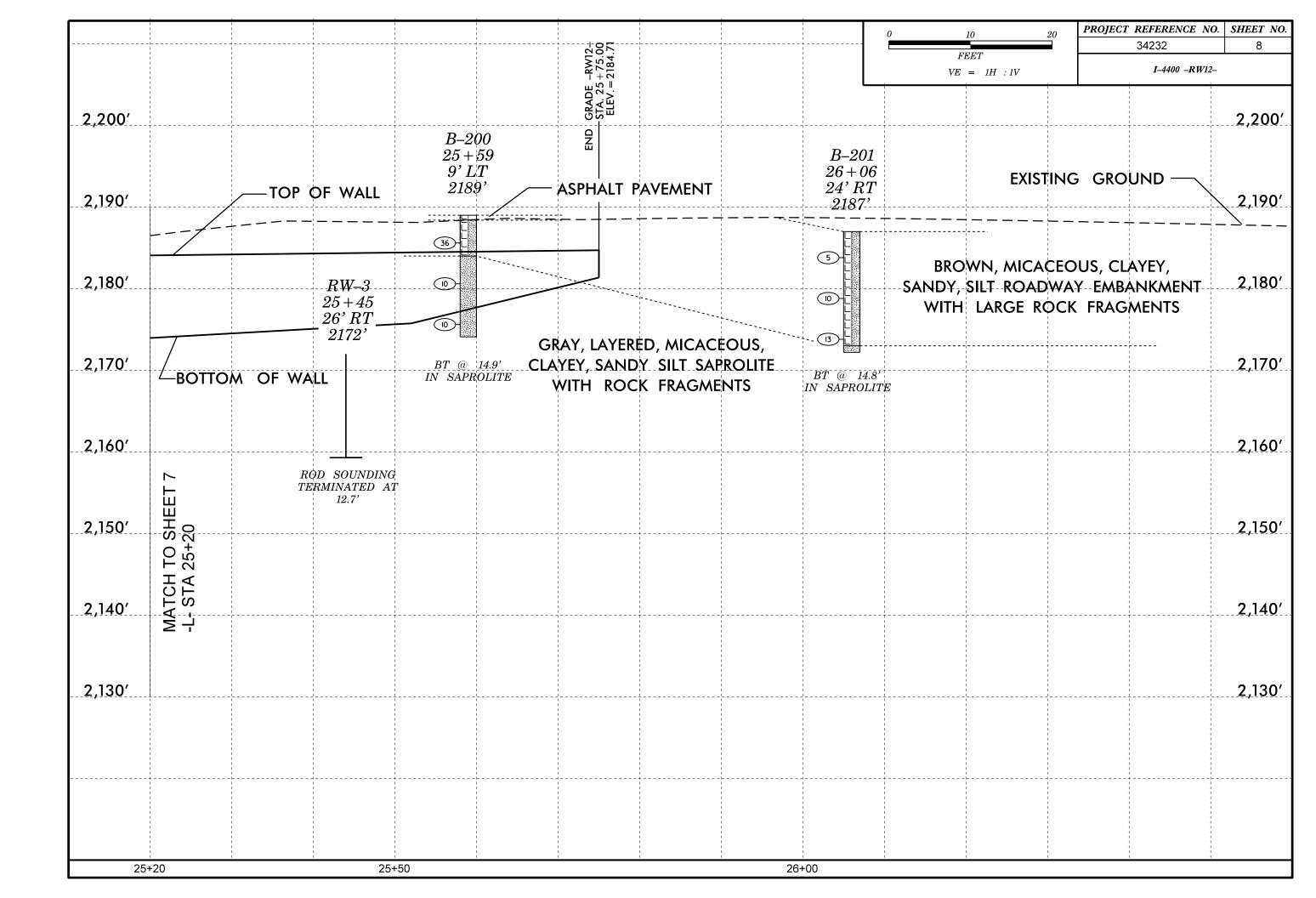


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## **CONTENTS**

<u>SHEET NO.</u>	
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5-6	

4400B

REFERENCE

**DESCRIPTION** TITLE SHEET

LEGEND (SOIL & ROCK)

SITE PLAN

PROFILE BORE LOGS

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION I-26 FROM US 64 (EXIT 49) TO US 25 BUSINESS (EXIT 44)

SITE DESCRIPTION **RETAINING WALL 6** VERTICAL ABUTMENT WALL FOR CLEAR CREEK RD **BRIDGE OVER I-26 (440217)** 

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOT A SHEE
N.C.	34232	1	6

#### 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 REVIEWED OR INSPECTED IN RALEICH 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 SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOL 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 BORNICS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-FLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OSESURFACE MATER AND THE SUBSURFACE RONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WASTER LEVELS OR SOL MOISTURE CONDITIONS MAY VARY. CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

- NOTES: I. 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. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. 2.

PERSONNEL

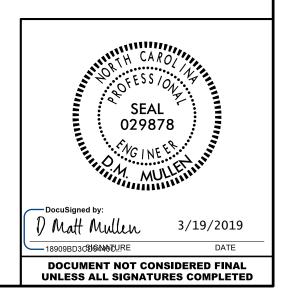
#### S. WOODS

M. ARNOLD

S. DAVIS

INVESTIGATED BY \_\_\_\_\_. MULLEN DRAWN BY \_\_\_\_\_\_. MULLEN CHECKED BY \_\_\_\_\_\_. C. KUHNE

SUBMITTED BY J.C. KUHNE



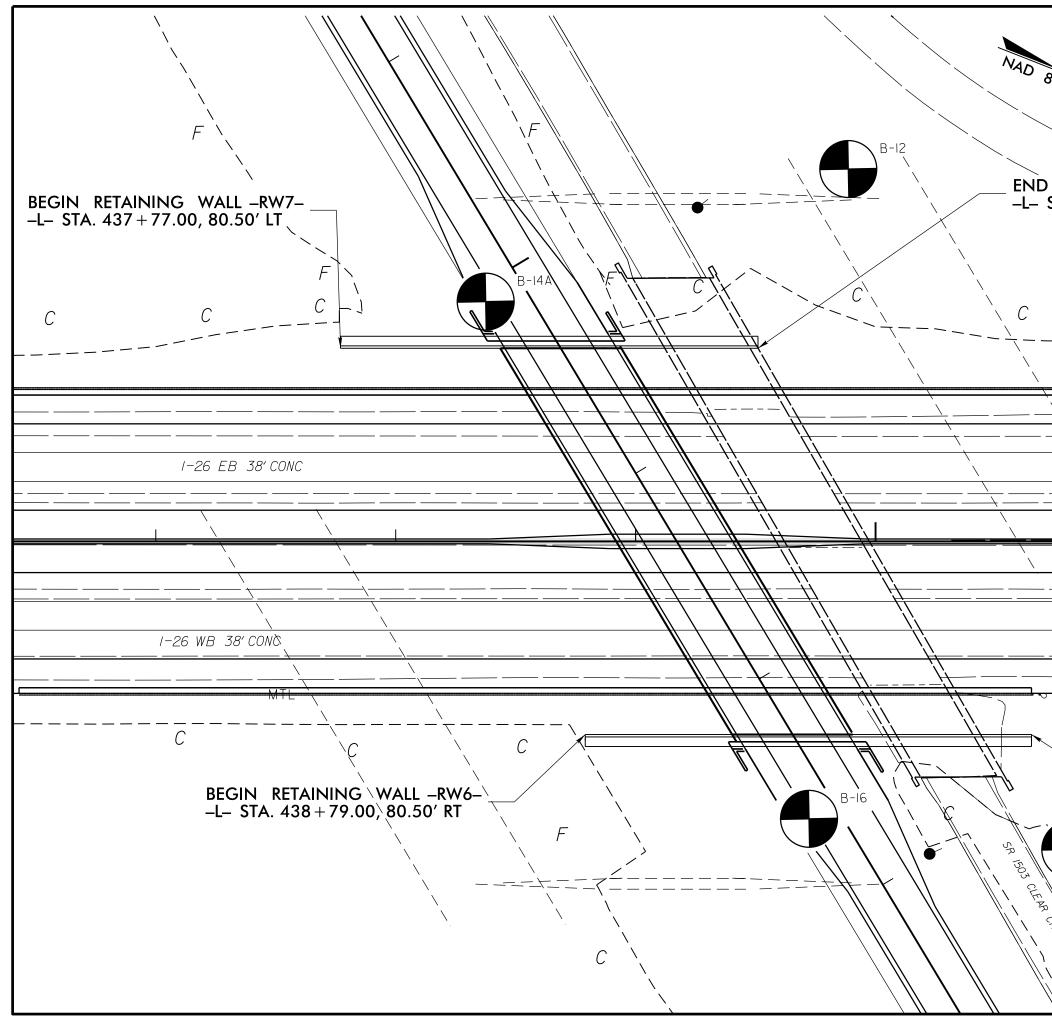
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

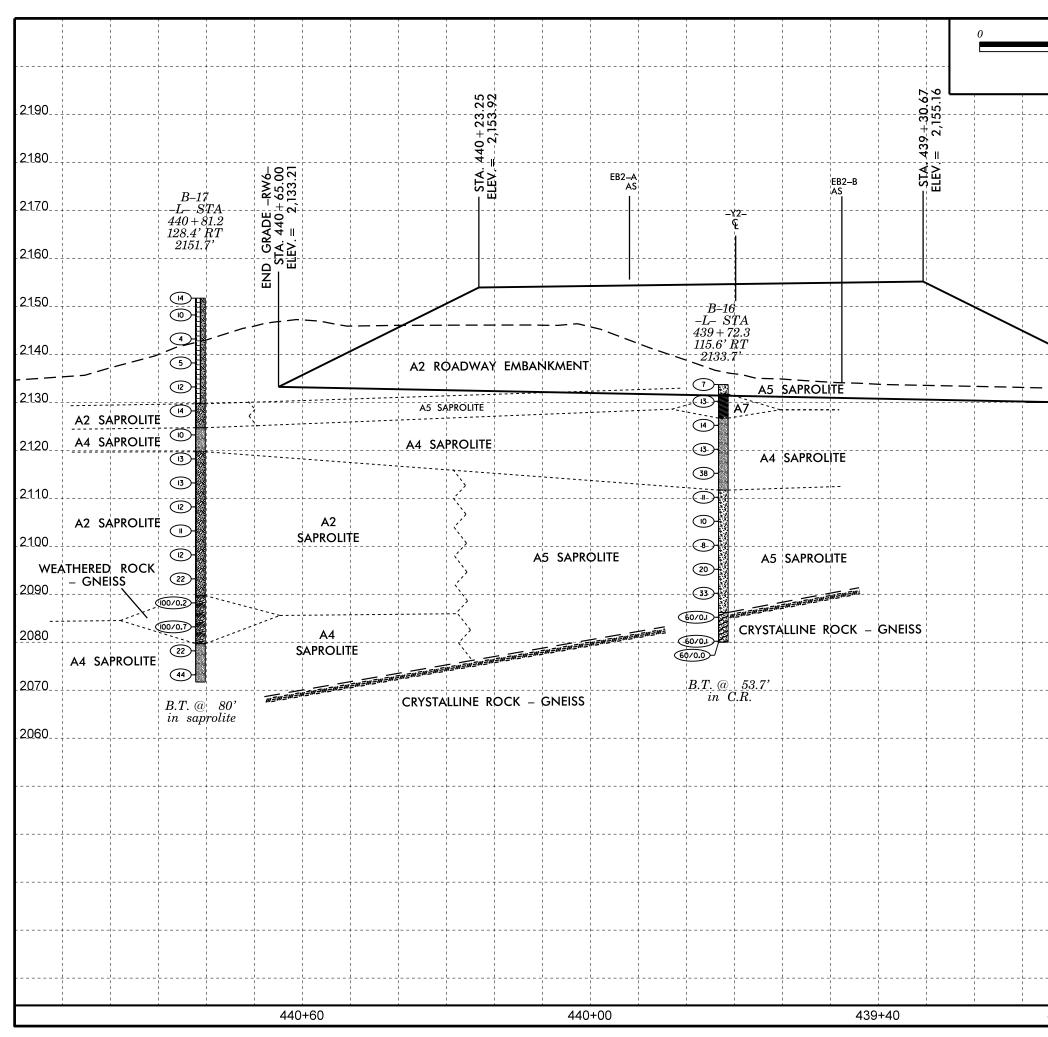
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AUUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN 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:	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 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
	MINERALOGICAL COMPOSITION	THE FILE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE LEVEL HI
CLASS. ( ≤ 35% PASSING * 200) (> 35% PASSING * 200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) WOULD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LL < 31	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 OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
2. PASSING *10 50 MX SILT- GRANULAR SILT- MUCK,	HIGHLY COMPRESSIBLE LL > 50 PERCENTAGE OF MATERIAL	C(P) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*40 30 MX 50 MX 51 MN SOILS COLLS FOR EACH SOILS	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
VM 65 VM 65 VM 65 VM 65 VM 65 XM 65 XM 65 XM 65 XM 65 XM 65 XM 61 VM 65 XM 61 UM 57	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING #40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL – – 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN LITTLE OR PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX ND MX AMOUNTS OF		OF A CRYSTALLINE NATURE. 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 FRACS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND FINE SILIT UK LLATET SILIT ULATET MATTER	STATIC WATER LEVEL AFTER <u>24</u> HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU		MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL	E	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.
PIOF A-7-5 SUBGROUP IS ≤ LL - 30 ;PIOF A-7-6 SUBGROUP IS > LL - 30	- O-M- Spring or seep	WITH FRESH ROCK. MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	F <u>ORMATION (FM.)</u> - 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		(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPRETING PENETRATION RESISTENCE COMPRESSIVE STRENGTH CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE) 20020 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
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 LUUSE 4 IU 10 MEDIUM DENSE 10 TO 30 N/A	RAT .	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT OF AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE > 50	INFERRED SOIL BOUNDARY - CORE BORING • SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	Ý	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0           MATERIAL         STIFF         8 TO 15         1 TO 2	TIST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER - SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4		ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 DPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BUDLDER COBBLE GRAVEL SAND SAND SILI CLAY		MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(USE, SU,) (F SU,)		HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	- CL CLAY MOD MODERATELY $\gamma$ - 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 TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <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	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	<u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - 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           F0SS F0SSILIFEROUS         SLI SLIGHTLY         RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WET - (W) SEMISULID RECORDS DATING TO ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS         w - MOISTURE CONTENT         CBR - CALIFORNIA BEARING           HI HIGHLY         V - VERY         RATIO	FRACTURE SPACING BEDDING	BENCH MARK: N/A: ELEVATIONS DERIVED FROM DTM
	EQUIPMENT USED ON SUBJECT PROJECT	TERM         SPACING         TERM         THICKNESS           VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED         4 FEET	ELEVATION: N/A 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 Ø.16 TO 1 FOOT VERY THINLY BEDDED Ø.03 - Ø.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	
PLASTICITY		INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550     HARD FACED FINGER BITS     D-N     D-N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW		RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM		GENILE BLOW BY HAMMER DISINIEGRAIES 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		CRAINS ARE DISCIPLET TO SERADATE WITH STEEL PROPE.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YELLOW-BROWN, BLUE-GRAY),		INDURATED DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

#### PROJECT REFERENCE NO.





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20		40	PROJECT		ENCE NO.	-	ET NO.
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## GEOTECHNICAL BORING REPORT BORE LOG

							ORE L							
WBS 34232					<b>P</b> I-4400B		HENDER	SON		GEOLOGI	ST M. Arno			
			from l		(Exit 49) to US 25 Bu	siness (E							GROUNE	
BORING NO	. B-16	6		S	<b>TATION</b> 439+72.3		OFFSET	15.6 ft RT	-	ALIGNME			0 HR.	27
COLLAR EL	<b>EV.</b> 2,	133.7	ft	т	OTAL DEPTH 53.7 ft		NORTHING				<b>EASTING</b> 969,976			25
DRILL RIG/HA	MMER E	FF./DA	TE F8	R2175	CME-55 88% 02/11/2017			DRILL MET	HOD H	.S. Augers		HAMME	R TYPE	Automatio
DRILLER S	. Davis			S	TART DATE 01/08/18	3	COMP. DAT	E 01/08/	18	SURFACE	WATER DE	PTH N/A	4	
ELEV DRIVE (ft) (ft)	DEPTH (ft)	BLC 0.5ft	OW COU 0.5ft	JNT 0.5ft	BLOWS F		75 100	SAMP.	L O MOI G	ELEV. (ft)	SOIL AND RO	OCK DESC	RIPTION	DEPTH
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_2,155.7		1	3	4	•			n	M N	-	RE	SIDUAL		-5)
2130 2,130.2	3.5				· \ · ·   · · · ·						d-Brown, Fine S ith Trace Mica	and Organ	$\frac{1}{\sqrt{1-\frac{1}{2}}}$	)
	ŧ	4	6	7	13	· · · ·			и	-	Red-Brown,	, Silly CLAY	( <i>I</i> -0)	
	‡					 				2,126.7 Wh	nite-Tan-Brown	, Fine Sand	Jy SILT (A-	4)
125 2,125.2	+ <sup>8.5</sup>	6	7	7	+		+	'	и	— with	Trace Mica, M	langanese Fragments	Deposits, a	and
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	‡					· · · · ·				2,111.7				
<u>110 2,110.2</u>	23.5	4	6	5			· · · ·	.		– Tan – Trac	-Orange-Browr e Mica, Manga	nese Depos	sits, and Tr	/ith race
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SHEET 5

## GEOTECHNICAL BORING REPORT BORE LOG

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	34232					<b>IP</b> I-440				Y HEND	ERSON				GEOLOGIST S. Woods			WBS	<b>3</b> 342	32.1.3			TI	<b>P</b> I-4400B	COUNT	Υ
SITE	DESCR		I-26	6 from	US 64	4 (Exit 49)	to US	S 25 Bu	siness (	Exit 44)							D WTR (ft)	SITE	DESC	RIPTIO	N I-26	6 from	US 64	(Exit 49) to US 25	Business (I	Exi
BOR	ING NO.	B-17			s	TATION	440-	+81.2		OFFSE	Г 128.4	ft RT			ALIGNMENT -L-	0 HR.	50.7	BOR	RING N	<b>O.</b> B-17	7		S	<b>FATION</b> 440+65		0
COL	LAR ELE	<b>EV.</b> 2,	151.7	ft	т	OTAL DE	PTH	80.0 ft		NORTH	<b>NG</b> 601	,732			EASTING 969,948	24 HR.	47.1	COL	LAR E	<b>LEV.</b> 2	,151.7	ft	т	DTAL DEPTH 80.0	) ft	N
DRILL	RIG/HAI	MMER E	FF./DA	TE F8	R2175	5 CME-55 8	88% 0	2/11/201	7		DRILL	METH	HOD	H.S.	Augers HAMI	IER TYPE	Automatic	DRIL	L RIG/H	AMMER	EFF./DA	ATE F	&R2175	CME-55 88% 02/11/2	2017	
DRIL	<b>LER</b> S	. Davis			s	TART DA	TE (	01/29/1	8	COMP.	DATE 0	1/29/1	8			I/A		DRIL	LER	S. Davis	5		ST	TART DATE 01/29	<del>)</del> /18	С
ELEV	DRIVE ELEV	DEPTH	BLC	ow cou	JNT		E	BLOWS F	PER FOOT	г Г	SAM	P. 🔻			SOIL AND ROCK DES			ELEV	DRIV		H BL	ow co	UNT	BLOW	'S PER FOOT	Г
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	0	75 1	00 NO.	М			_EV. (ft)		DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75
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#### SHEET

/ HENDER	SON			GEOLOGIST S. Woods	S		
xit 44)						GROUN	D WTR (ft)
OFFSET 1	28.4 ft	RT		ALIGNMENT -L-		0 HR.	50.7
NORTHING	601,7	32		EASTING 969,948		24 HR.	47.1
	DRILL N		D H.S	6. Augers	HAMM	ER TYPE	Automatic
COMP. DAT				SURFACE WATER DEP			
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## **CONTENTS** SHEET NO.

2

3

4400BB

REFERENCE

TITLE SHEET LEGEND SITE PLAN 4-5 WALL PROFILE

**DESCRIPTION** 

## STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION 1-26 FROM EXIT 49 (US 64) TO EXIT 44 (US 25)

SITE DESCRIPTION \_\_\_\_\_ RETAINING WALL -RWIO-STA 637+28 TO 639+55

# 4232. Õ PROJEC

STATE	STATE PROJEC	SHEET NO.	TOTAL SHEETS	
N.C.	34232.1.1	I-4400BB	1	5

#### **CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNIKG AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

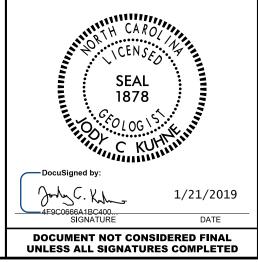
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UNI-FLACE) 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 SOLL 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 OF CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDENSATION.

- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR CUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

SI D

PERSONNEL



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

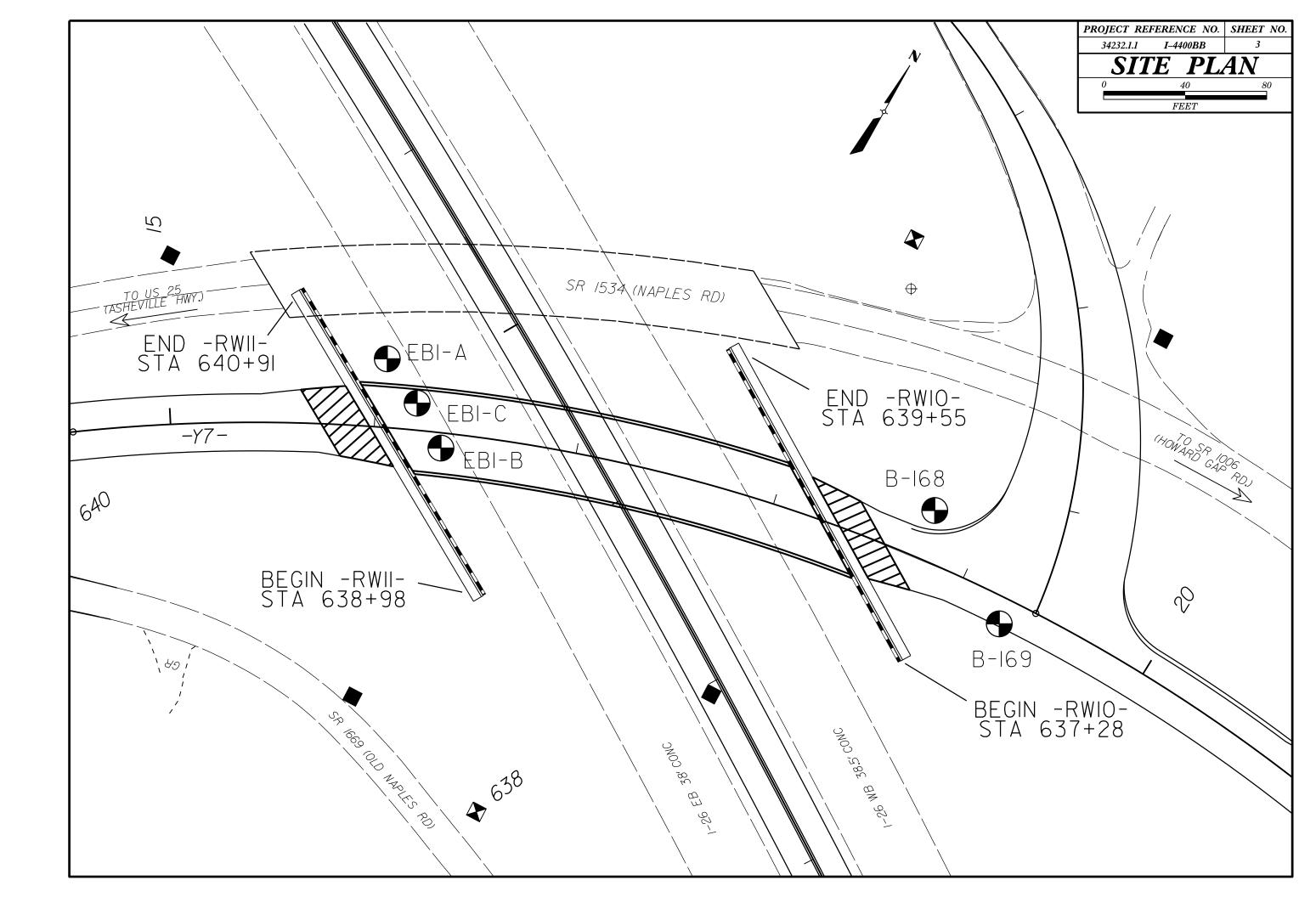
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

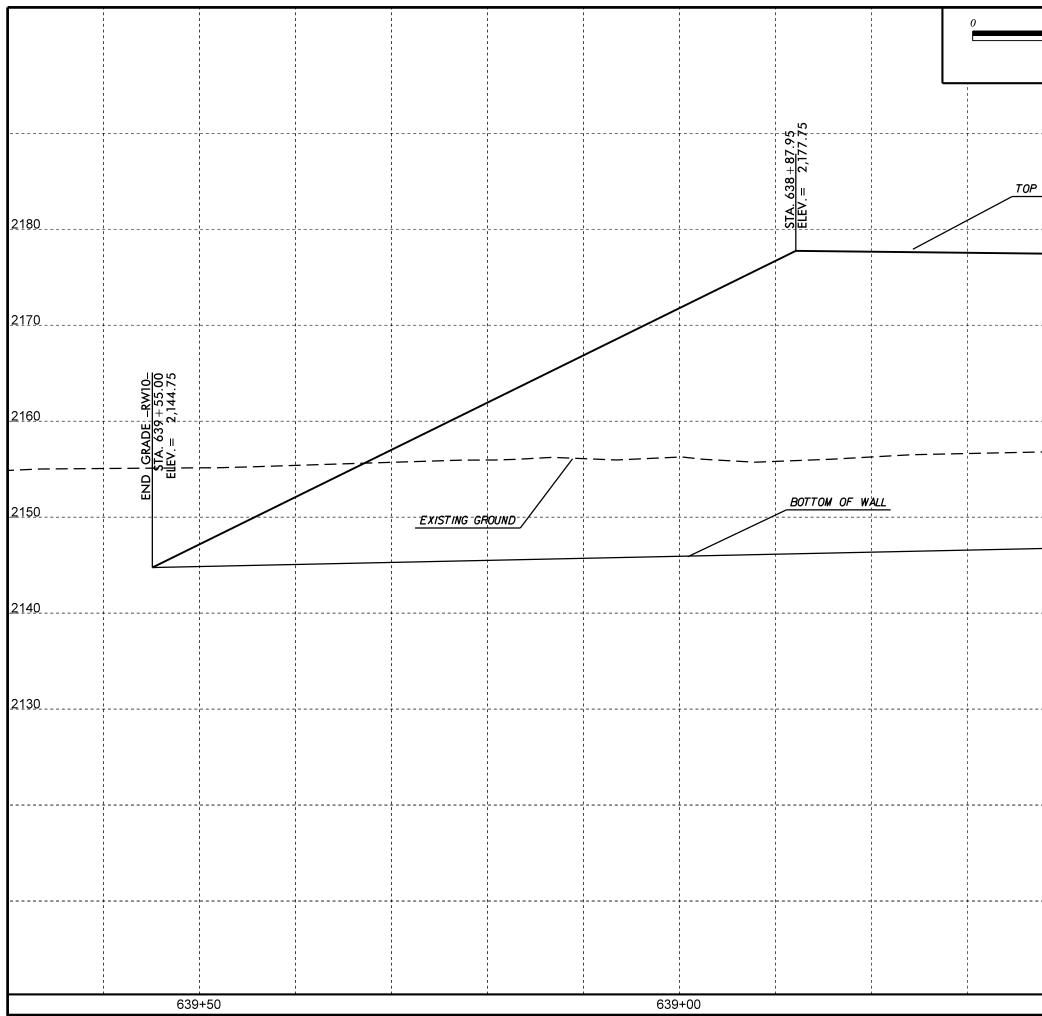
	SOIL	DESCRIPTION		GRADATION	ROCK DESCRIPTION			
	CONSIDERED UNCONSOLIDATED, SEMI-CO			WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO				
	RATED WITH A CONTINUOUS FLIGHT P NG TO THE STANDARD PENETRATION T			UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE S				
IS B	ASED ON THE AASHTO SYSTEM. BASIC	DESCRIPTIONS GENERALLY I	NCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SI	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OF REPRESENTED BY A ZONE OF WEATHERED ROCK.			
	NCY, COLOR, TEXTURE, MOISTURE, AASH1 S MINERALOGICAL COMPOSITION, ANGUL			ANGULARITY OF GRAINS	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:			
	ERY STIFF.GRAY.SILTY CLAY.MOIST WITH IN	ITERBEDDED FINE SAND LAYERS	S.HIGHLY PLASTIC.A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERM ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VA			
	SOIL LEGEND AND	AASHTO CLASSIFI	CATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.			
GENERAL	GRANULAR MATERIALS	SILT-CLAY MATERIALS	ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK TH			
CLASS.	(≤ 35% PASSING #200)	( > 35% PASSING #200)		ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDE:			
GROUP CLASS. 4	A-1 A-3 A-2 A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLA			
0	00000000			SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)			
SYMBOL				MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY I			
% PASSING			SILT-		SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, (CP)			
	50 MX 30 MX 50 MX 51 MN		GRANULAR CLAY MUCK, SOILS CON PEAT		WEATHERING			
	15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35	MX 36 MN 36 MN 36 MN 36 MN	SOILS	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS			
MATERIAL				TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.			
PASSING #40 LL		MN 40 MX 41 MN 40 MX 41 MN	SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20 MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATING			
PI		MN 10 MX 10 MX 11 MN 11 MN	LITTLE OR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND				
GROUP INDEX	0 0 0 4 MX	8 MX 12 MX 16 MX NO MX	MODERATE ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP			
USUAL TYPES S	STONE FRAGS. FINE ON THE OD OLAVEY		ORGANIC	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELD			
OF MAJOR	GRAVEL, AND SAND GRAVEL AND SAND	SILTY CLAYEY SOILS SOILS	MATTER	STATIC WATER LEVEL AFTER <u>24</u> HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOW			
MATERIALS	SAND SING SING SING	00.20			MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD,) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROC			
GEN. RATING	EXCELLENT TO GOOD	FAIR TO POOR	FAIR TO POOR UNSUITABLE	✓ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS C			
AS SUBGRADE			PUUR	SPRING OR SEEP	WITH FRESH ROCK.			
		- 30 : PI OF A-7-6 SUBGROUP IS	> LL - 30	_	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSP			
		CY OR DENSENESS		MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN S			
PRIMARY S	OIL TYPE COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL			
	CONSISTENCY	(N-VALUE)	(TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION - OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT			
GENERAL	LY VERY LOOSE	< 4		SOIL SYMBOL SIL SYMBOL SIL SYMBOL SIL SYMBOL SIL SYMBOL SIL SYMBOL				
GRANULA		4 TO 10 10 TO 30	N/A		IF TESTED WOULD YIELD SPT N VALUES > 100 BPF			
MATERIA (NON-COH	HESIVE) DENSE	30 TO 50		ARTIFICIAL FILL (AF) OTHER OUGER BORING ONE PEI	TROMETER VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISC			
	VERY DENSE	> 50			SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRO			
CENEDAL	VERY SOFT	< 2 2 TO 4	< 0.25 0.25 TO 0.5	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING	ROD (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES</i>			
GENERAL SILT-CL4		4 TO 8	0.5 TO 1.0					
MATERIA		8 TO 15	1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPP			
(COHESIV	VE) VERY STIFF HARD	15 TO 30 > 30	2 TO 4	ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY	UE ALSO AN EXAMPLE.			
		OR GRAIN SIZE		RECOMMENDATION SYMBOLS	ROCK HARDNESS			
					VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REOL			
U.S. STD. SIE OPENING (MM				UNDERCUT IZZ UNSUITABLE WASTE ACCEPTABLE, BUT N				
		COARSE FINE		SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BA				
BOULDER (BLDR.)		SAND SAND			MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CA			
(BEDIN:/		(CSE. SD.) (F SD	.) (32.7 (22.7	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHE			
GRAIN MM		0.25	0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEA				
SIZE IN.				BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS			
	SOIL MOISTURE -	CORRELATION OF	TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{d}$ - DRY UNIT WE				
		MOISTURE GUIDE FOR	FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGM			
(ATTI	ERBERG LIMITS) DESCR	RIPTION		DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBRE</u> DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVENHE INCHES IN SIZE BI MODERNIE BEOWS OF A FICK POINT, SMA			
	- SATU		DUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOOL	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECE			
I	(SA)	r.) FROM BELOW	THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUB	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECE SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED RE			
PLASTIC		05:4100:10		FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTE	FINGERNALL.			
RANGE <	- WET	- (W)	REQUIRES DRYING TO IMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA				
(PI) PL	PLASTIC LIMIT			HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICK			
	- MOIST		R NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FE WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4			
OM .	OPTIMUM MOISTURE	SOLID, HT O	N NEHR OF THOSE HOISTONE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.			
56.				X CME-45C CLAY BITS AUTOMATIC				
	- DRY		DDITIONAL WATER TO IMUM MOISTURE	G' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0 THINLY LAMINATED < 0.008			
L					H INDURATION			
		ASTICITY			FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PR			
		TICITY INDEX (PI)	DRY STRENGTH		DURDING WITH EINGER EREES NUMEROUS CRAINS.			
	PLASTIC GHTLY PLASTIC	0-5 6-15	VERY LOW SLIGHT	VANE SHEAR TEST	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			
MODE	ERATELY PLASTIC	16-25	MEDIUM	CASING W/ ADVANCER	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL P			
HIGH	ILY PLASTIC	26 OR MORE	HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.			
		COLOR			INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE			
DESCRIPT	IONS MAY INCLUDE COLOR OR COLO		YELLOW-BROWN BUIE-CRAY		DIFFICULT TU BREAK WITH HAMMER.			
	DIFIERS SUCH AS LIGHT, DARK, STRE				SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:			
					SAMPLE BREAKS ACROSS GRAINS.			

#### PROJECT REFERENCE NO. I-4400BB



TERMS AND DEFINITIONS ED. AN INFERRED ) SPT REFUSAL. 1 FOOT PER 60 IS OFTEN ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. N VALUES > 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 IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND CK THAT SURFACE. CLUDES GRANITE, CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. AL PLAIN IF TESTED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. MAY NOT YIELD STONE, CEMENTED CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  $\underline{\text{DIKE}}$  - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. NATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS.  $\underline{\mathsf{FLOAT}}$  - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. ROCK HAS AS COMPARED FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. ELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO VIDENT BUT ITS LATERAL EXTENT. RE KAOLINIZED LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.)- IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE STRONG ROCK ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF SAPROLITE IS ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT REQUIRES SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE TACHED 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 R PICK POINT WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  $\underline{STRATA CORE RECOVERY (SREC.)}$ - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. FRAGMENTS T. SMALL. THIN 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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: ELEVATIONS TAKEN FROM ROADWAY PLANS THICKNESS 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: 3 - Ø.16 FEET 08 - 0.03 FEET 0.008 FEET AT, PRESSURE, ETC. TEEL PROBE:





	10	20	PROJECT	REFE	RENCE NO	D. SHEED	T NO.
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VE = 1:1			PROFILE THROUGH -RW10-				
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