

REFERENCE: I-5898

PROJECT: 46860

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM
PROJECT DESCRIPTION US 220/US 311 - NC 135
INTERCHANGE UPGRADE

SITE DESCRIPTION BRIDGE ON NC 135 (-Y-) OVER
US 220 (-L-) AND ASSOCIATED MSE WALLS

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5898	1	20

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT, AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

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

PERSONNEL

M. LEAR

S. HARDEE

J. HOWARD

INVESTIGATED BY WOOD E&IS, INC.

DRAWN BY R. RAHIE

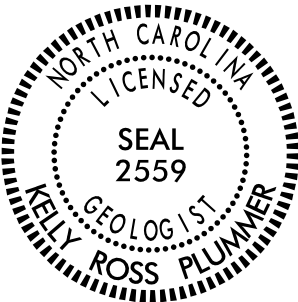
CHECKED BY M. LEAR

SUBMITTED BY K. PLUMMER

DATE NOVEMBER, 2021

WOOD E&IS, INC.
4021 STIRRUP CREEK DRIVE, SUITE 100
DURHAM, NORTH CAROLINA 27703
(919) 381-9900

NC Engineering F-1253 NC Geology C-247



SIGNATURE

DATE

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 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: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										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 PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										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. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERING																			
GENERAL CLASS.										MINERALOGICAL COMPOSITION										CRYSTALLINE ROCK (CR)																			
GROUP CLASS.										ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										NON-CRYSTALLINE ROCK (NCR)																			
SYMBOL										COMPRESSIBILITY										COASTAL PLAIN SEDIMENTARY ROCK (CP)																			
%										PERCENTAGE OF MATERIAL																													
PASSING #10 #40 #200										ORGANIC MATERIAL																													
50 MX 30 MX 15 MX										GRANULAR SOILS																													
50 MX 30 MX 15 MX										SILT-CLAY MATERIALS																													
50 MX 30 MX 15 MX										SILT-CLAY SOILS																													
50 MX 30 MX 15 MX										MUCK, PEAT																													
MATERIAL PASSING #40 LL PI										SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER																													
GROUP INDEX										HIGHLY ORGANIC SOILS																													
USUAL TYPES OF MAJOR MATERIALS										FAIR TO POOR																													
GEN. RATING AS SUBGRADE										POOR																													
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																																							
CONSISTENCY OR DENSENESS										RECOMMENDATION SYMBOLS										ROCK HARDNESS																			
PRIMARY SOIL TYPE										ABBREVIATIONS										VERY HARD																			
COMPACTNESS OR CONSISTENCY										EQUIPMENT USED ON SUBJECT PROJECT										HARD																			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)										DRILL UNITS:										MODERATELY HARD																			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ADVANCING TOOLS:										VERY HARD																			
N/A										HAMMER TYPE:										HARD																			
< 4										CORE BORING										MODERATELY HARD																			
4 TO 10										MONITORING WELL										MODERATELY HARD																			
10 TO 30										PIEZOMETER INSTALLATION										MODERATELY HARD																			
30 TO 50										SPT N-VALUE										MODERATELY HARD																			
> 50																				MODERATELY HARD																			
< 2																				MODERATELY HARD																			
2 TO 4																				MODERATELY HARD																			
4 TO 8																				MODERATELY HARD																			
8 TO 15																				MODERATELY HARD																			
15 TO 30																				MODERATELY HARD																			
> 30																				MODERATELY HARD																			
TEXTURE OR GRAIN SIZE																				MODERATELY HARD																			
U.S. STD. SIEVE SIZE OPENING (MM)																				MODERATELY HARD																			
4 10 40 60 200 270																				MODERATELY HARD																			
4.75 2.00 0.42 0.25 0.075 0.053																				MODERATELY HARD																			
BOULDER (BLDR.)																				MODERATELY HARD																			
COBBLE (COB.)																				MODERATELY HARD																			
GRAVEL (GR.)																				MODERATELY HARD																			
COARSE SAND (CSE. SD.)																				MODERATELY HARD																			
FINE SAND (F SD.)																				MODERATELY HARD																			
SILT (SL.)																				MODERATELY HARD																			
CLAY (CL.)																				MODERATELY HARD																			
GRAIN SIZE																				MODERATELY HARD																			
305 75 2.0 0.25 0.05 0.005																				MODERATELY HARD																			
12 3																				MODERATELY HARD																			
SOIL MOISTURE - CORRELATION OF TERMS																				MODERATELY HARD																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)																				MODERATELY HARD																			
FIELD MOISTURE DESCRIPTION																				MODERATELY HARD																			
GUIDE FOR FIELD MOISTURE DESCRIPTION																				MODERATELY HARD																			
LL - LIQUID LIMIT																				MODERATELY HARD																			
PL - PLASTIC LIMIT																				MODERATELY HARD																			
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT																				MODERATELY HARD																			
SL - SHRINKAGE LIMIT																				MODERATELY HARD																			
PLASTICITY																				MODERATELY HARD																			
NON PLASTIC																				MODERATELY HARD																			
SLIGHTLY PLASTIC																				MODERATELY HARD																			
MODERATELY PLASTIC																				MODERATELY HARD																			
HIGHLY PLASTIC																				MODERATELY HARD																			
COLOR																				MODERATELY HARD																			
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																				MODERATELY HARD																			

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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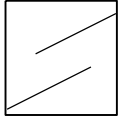
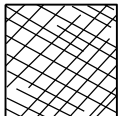
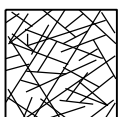
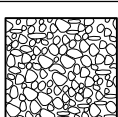
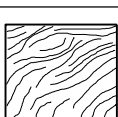
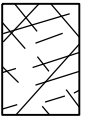
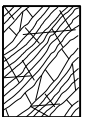
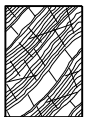
SUBSURFACE INVESTIGATION

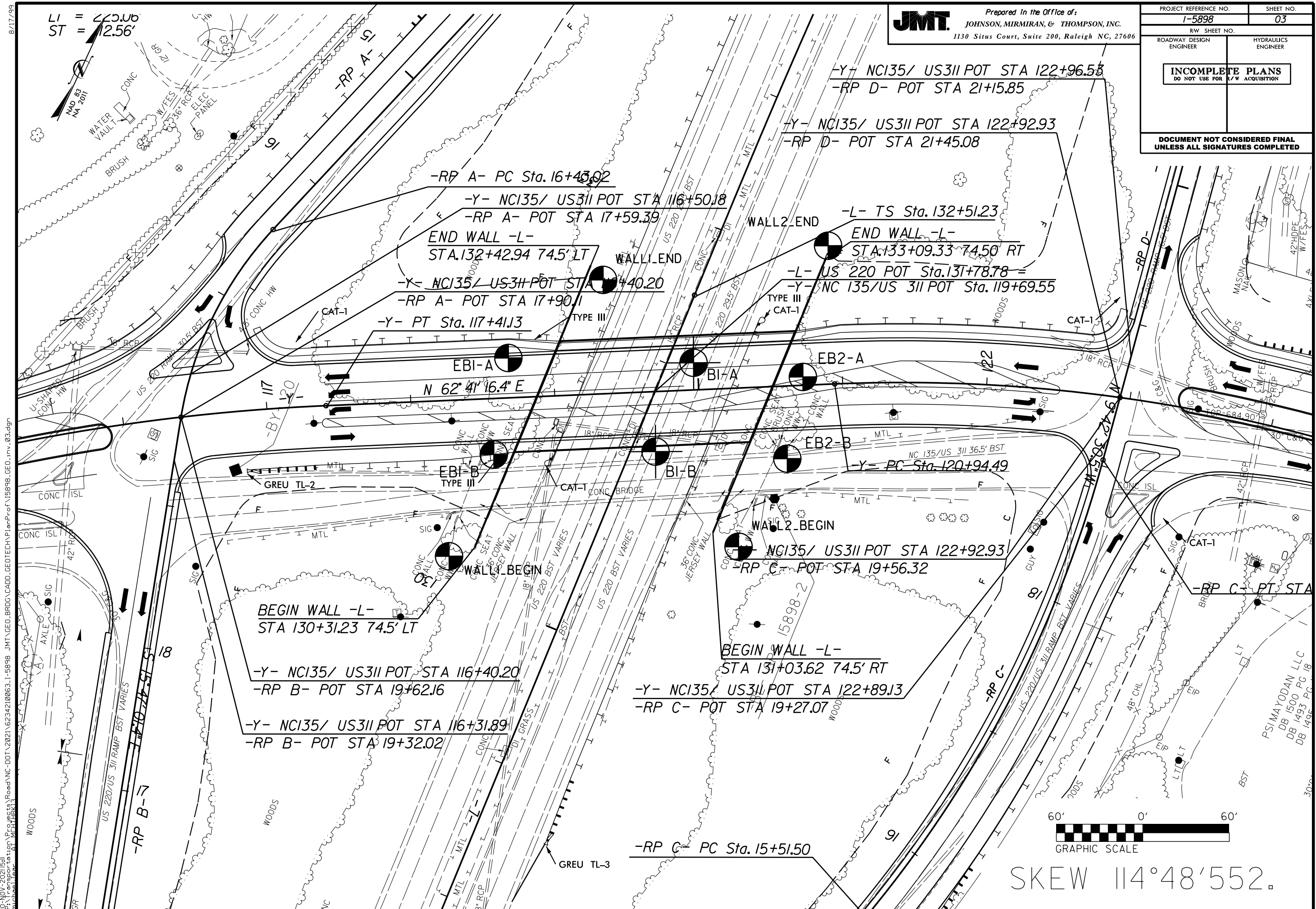
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES

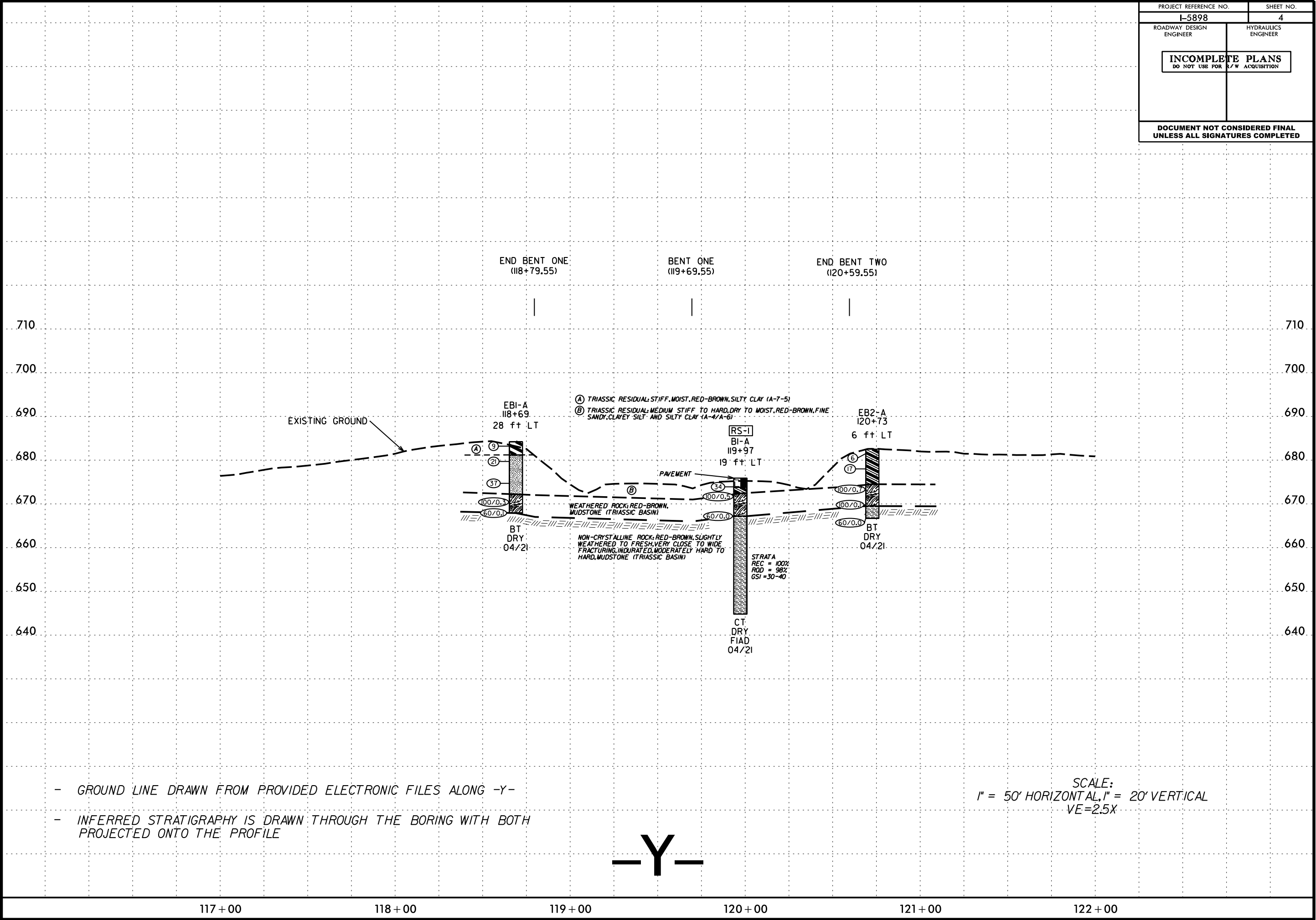
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 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.	SURFACE CONDITIONS VERY GOOD Very rough, fresh unweathered surfaces GOOD Rough, slightly weathered, iron stained surfaces FAIR Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments VERY POOR 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 fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes) VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	DECREASING INTERLOCKING OF ROCK PIECES 90 80 70 60 50 40 30 20 10 N/A N/A	COMPOSITION AND STRUCTURE 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. B. Sandstone with thin interlayers of siltstone C. Sandstone and siltstone in similar amounts D. Siltstone or silty shale with sandstone layers E. Weak siltstone or clayey shale with sandstone layers 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. F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.	70 60 50 40 30 20 10





- GROUND LINE DRAWN FROM PROVIDED ELECTRONIC FILES ALONG -Y-
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH
PROJECTED ONTO THE PROFILE

SCALE:
1" = 50' HORIZONTAL, 1" = 20' VERTICAL
VE=2.5X

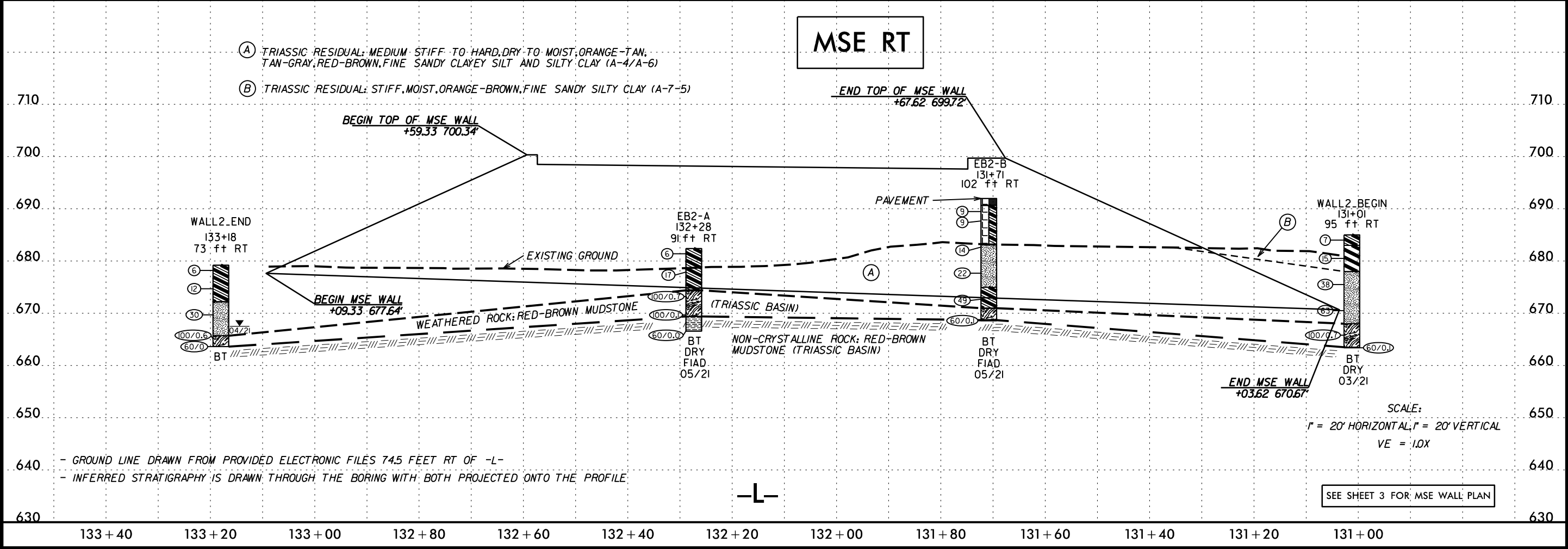
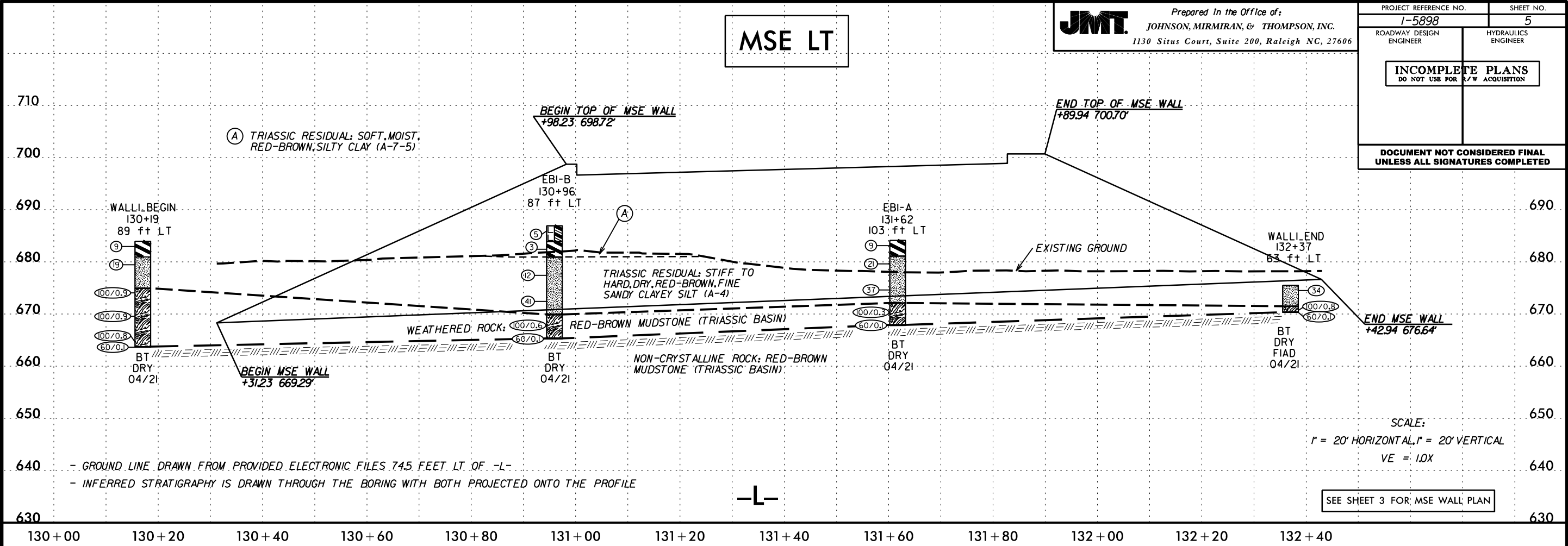
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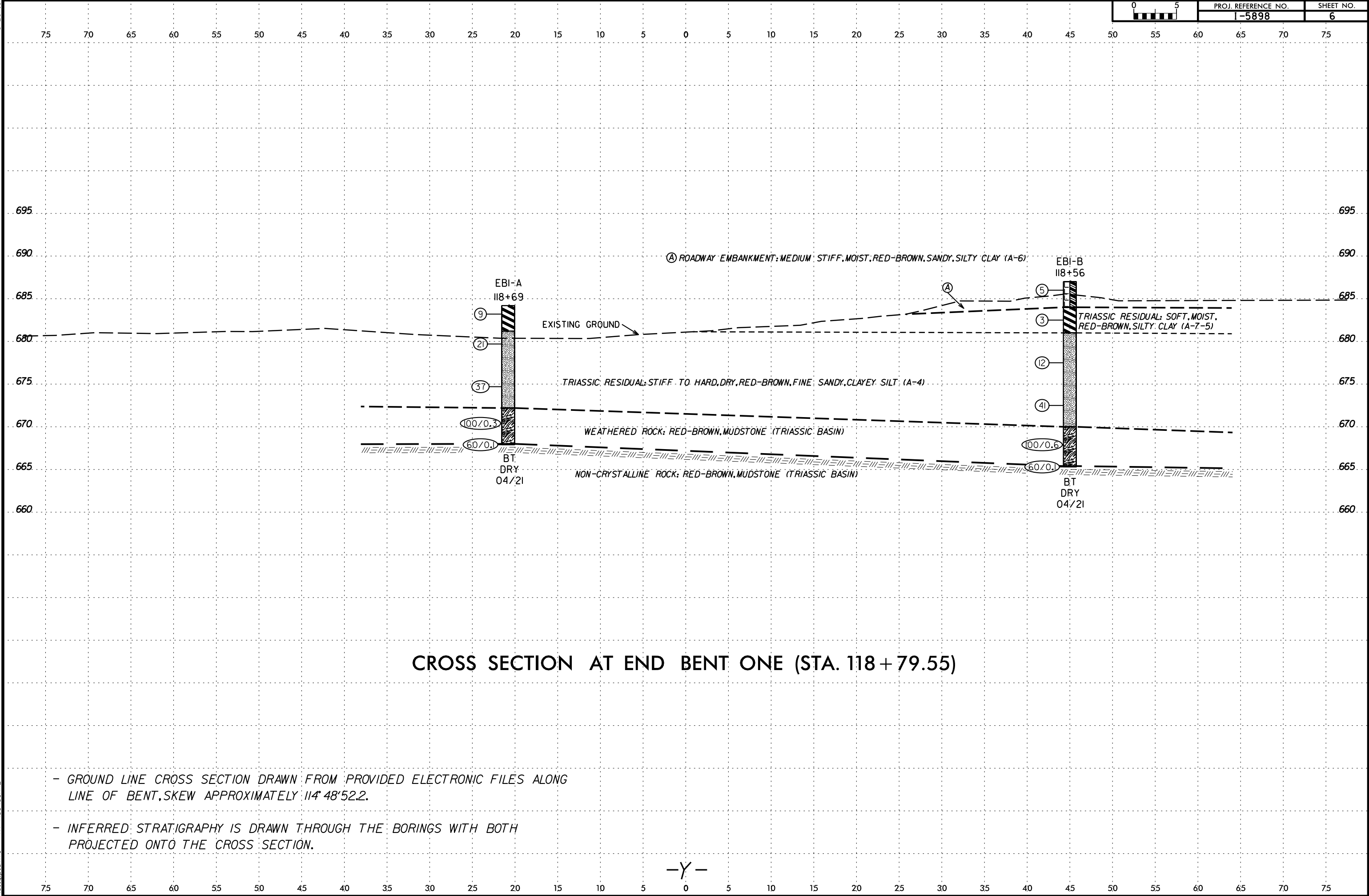
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drawing title

JMT. Prepared In the Office of:
JOHNSON, MIRMIRAN, & THOMPSON, INC.
1130 Situs Court, Suite 200, Raleigh NC, 27606

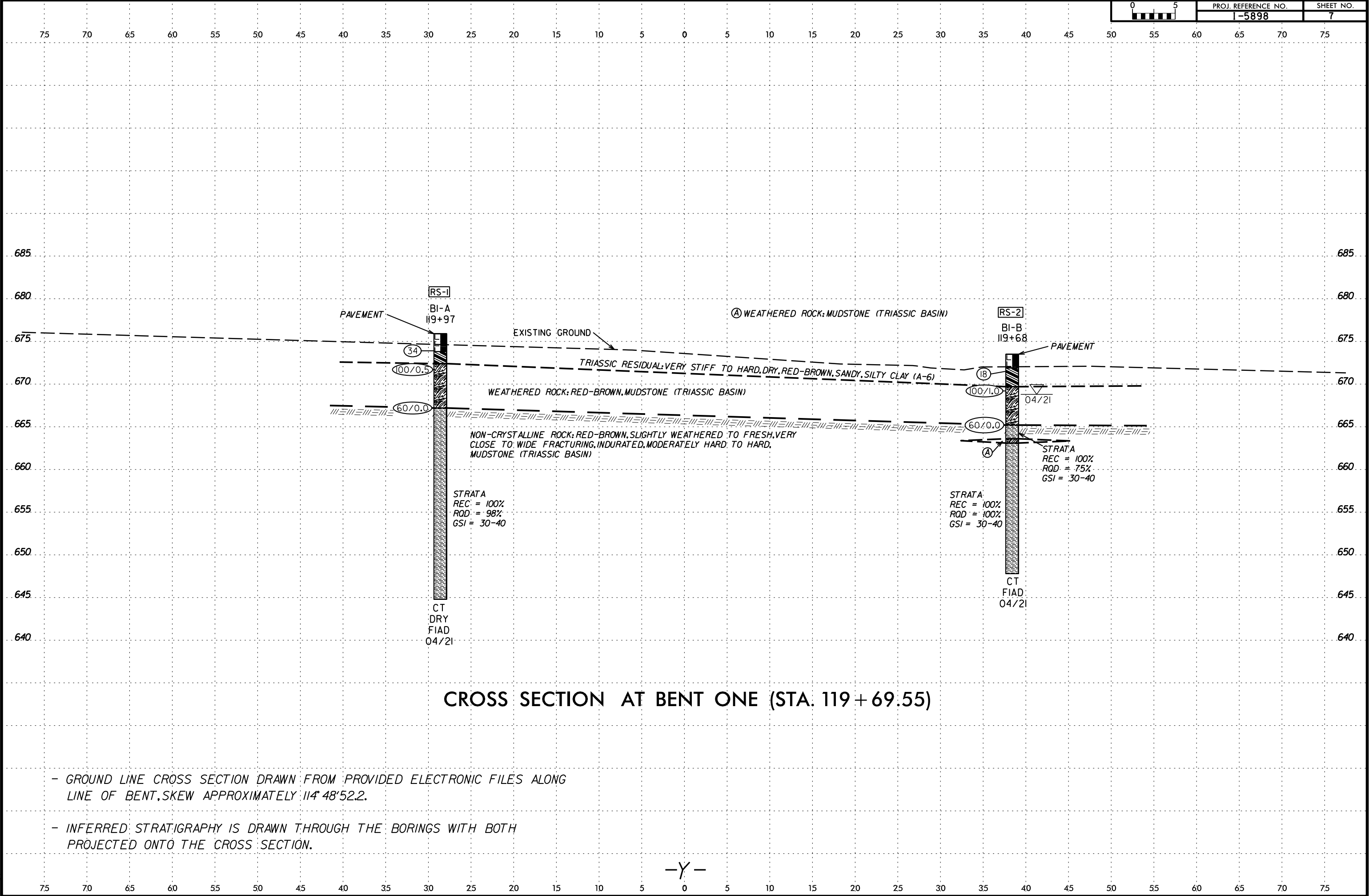
PROJECT REFERENCE NO.		SHEET NO.	
1-5898		5	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			





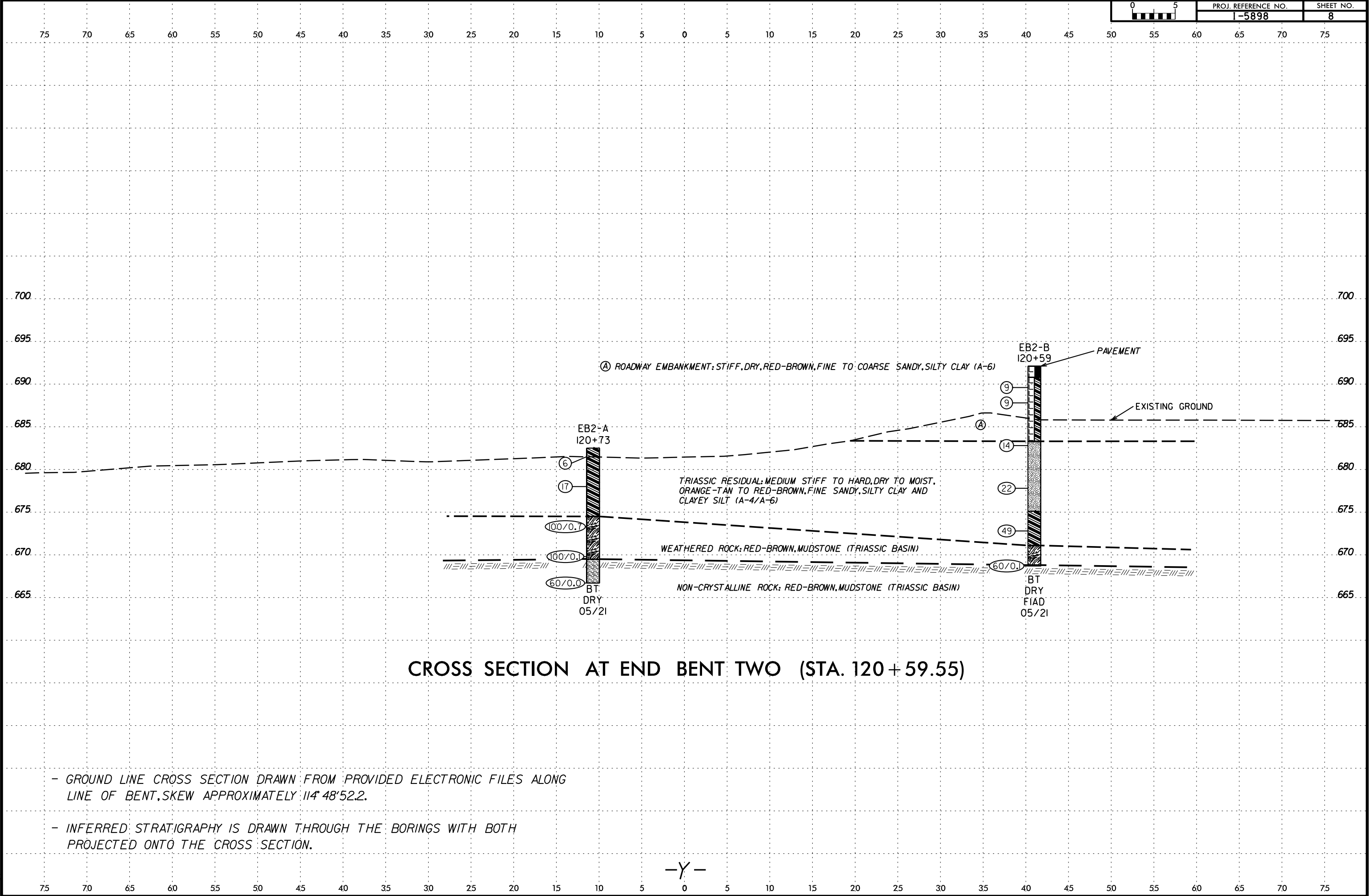
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kelluplum



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1			TIP I-5898			COUNTY ROCKINGHAM			GEOLOGIST J. Howard				
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)									GROUND WTR (ft)				
BORING NO. EB1-A			STATION 118+69			OFFSET 28 ft LT			ALIGNMENT -Y-				
COLLAR ELEV. 684.2 ft			TOTAL DEPTH 16.3 ft			NORTHING 971,928			EASTING 1,723,829				
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER S. Hardee			START DATE 04/05/21			COMP. DATE 04/05/21			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)
685	684.2	0.0										684.2	0.0
680	680.7	3.5	2	4	5	9						681.2	3.0
			6	9	12								
675	675.7	8.5											
670	670.7	13.5	11	17	20							672.2	12.0
	668.0	16.2										668.0	16.2
												667.9	16.3

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1			TIP I-5898			COUNTY ROCKINGHAM			GEOLOGIST J. Howard					
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)									GROUND WTR (ft)					
BORING NO. EB1-B			STATION 118+56			OFFSET 39 ft RT			ALIGNMENT -Y-					
COLLAR ELEV. 687.0 ft			TOTAL DEPTH 21.7 ft			NORTHING 971,863			EASTING 1,723,848					
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER S. Hardee			START DATE 04/05/21			COMP. DATE 04/05/21			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)
690														
685	687.0	0.0											687.0	GROUND SURFACE 0.0
680	683.5	3.5	1	2	3								684.0	ROADWAY EMBANKMENT 3.0
675	683.5		1	1	2								681.0	TRIASSIC RESIDUAL 6.0
670	678.5	8.5												
	673.5	13.5	4	5	7									
	668.5	18.5	15	20	21								670.0	WEATHERED ROCK 17.0
	665.4	21.6	75	25/0.1									665.4	NON-CRYSTALLINE ROCK 21.6
													665.3	NON-CRYSTALLINE ROCK 21.7

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1			TIP I-5898			COUNTY ROCKINGHAM			GEOLOGIST J. Howard				
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)										GROUND WTR (ft)			
BORING NO. B1-A			STATION 119+97			OFFSET 19 ft LT			ALIGNMENT -Y-		0 HR. Dry		
COLLAR ELEV. 675.9 ft			TOTAL DEPTH 31.1 ft			NORTHING 971,979			EASTING 1,723,947		24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD Core Boring			HAMMER TYPE Automatic				
DRILLER S. Hardee			START DATE 04/08/21			COMP. DATE 04/08/21			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
680													
675	674.9	1.0	15	16	18								675.9 GROUND SURFACE 0.0
													673.8 ROADWAY EMBANKMENT 2.1
	672.2	3.7	100/0.5										672.4 ASPHALT (0.0-0.7'), ABC Stone (0.7-2.1') 2.1
670													672.4 TRIASSIC RESIDUAL 3.5
													Hard, dry, red-brown, sandy, silty CLAY (A-6)
													WEATHERED ROCK
	667.2	8.7	60/0.0										667.2 Red-brown, MUDSTONE (Triassic Basin) 8.7
665													NON-CRYSTALLINE ROCK
													Red-brown, MUDSTONE (Triassic Basin)
													STRATA REC. = 100%
													STRATA RQD = 98%
													STRATA GSI = 30-40
660													
655													
650													
645											RS-1		644.8 Boring Terminated at Elevation 644.8 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin) 31.1

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/28/21

GEOTECHNICAL BORING REPORT
CORE LOG

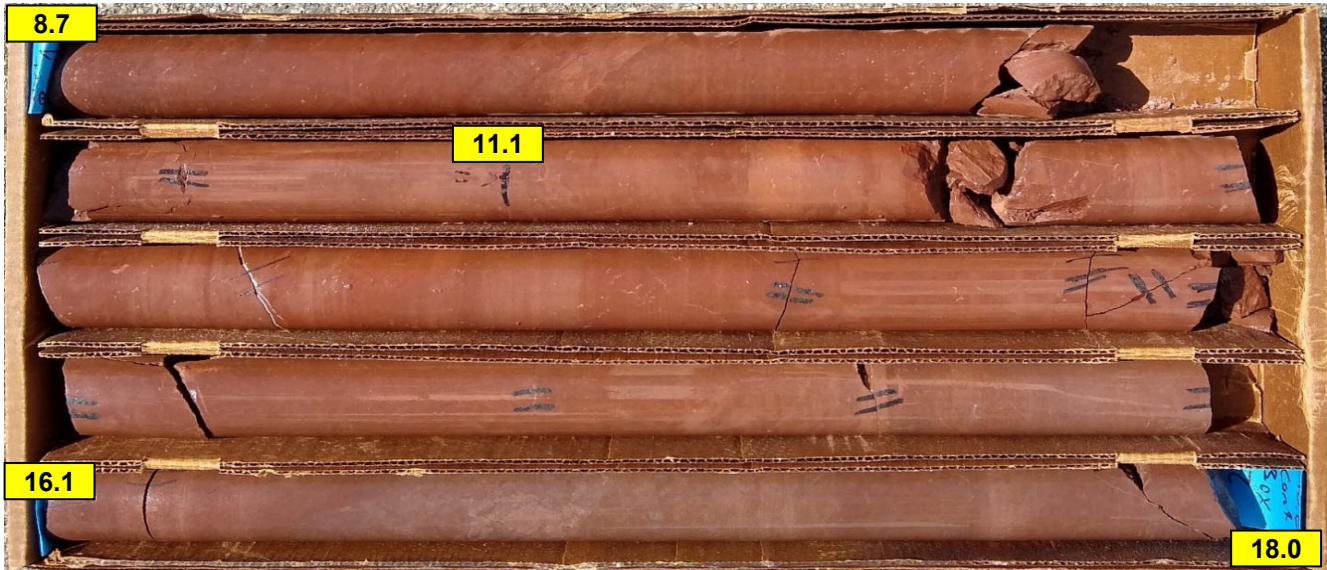
WBS 46860.1.1				TIP I-5898		COUNTY ROCKINGHAM				GEOLOGIST J. Howard					
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)										GROUND WTR (ft)					
BORING NO. B1-A				STATION 119+97				OFFSET 19 ft LT				ALIGNMENT -Y-		0 HR. Dry	
COLLAR ELEV. 675.9 ft				TOTAL DEPTH 31.1 ft				NORTHING 971,979				EASTING 1,723,947		24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD Core Boring				HAMMER TYPE Automatic					
DRILLER S. Hardee				START DATE 04/08/21				COMP. DATE 04/08/21				SURFACE WATER DEPTH N/A			
CORE SIZE NQ				TOTAL RUN 22.4 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	LOG	DESCRIPTION AND REMARKS			DEPTH (ft)	
667.2											Begin Coring @ 8.7 ft				
665	667.2	8.7	2.4	N=60/0.0	(2.4)	(2.2)		(22.4)	(22.0)		667.2	NON-CRYSTALLINE ROCK		8.7	
	664.8	11.1	5.0	2:15	100%	92%					Red-brown, very slightly weathered to fresh, close to wide fracturing, indurated, hard, MUDSTONE (Triassic Basin) (GSI=30-40)				
				1:30											
				0.45/0.4	(5.0)	(4.8)									
				1:45	100%	96%									
				1:15											
660	659.8	16.1	5.0	1:30											
				1:15											
				1:15	(5.0)	(5.0)									
				1:15	100%	100%									
655	654.8	21.1	5.0	1:00											
				1:30	(5.0)	(5.0)									
				1:45	100%	100%									
650	649.8	26.1	5.0	1:00											
				0:45											
				0:45											
				1:30	(5.0)	(5.0)									
645	644.8	31.1		1:00	100%	100%	RS-1				644.8	Boring Terminated at Elevation 644.8 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin)		31.1	

NC DOT CORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/28/21

CORE PHOTOGRAPHS

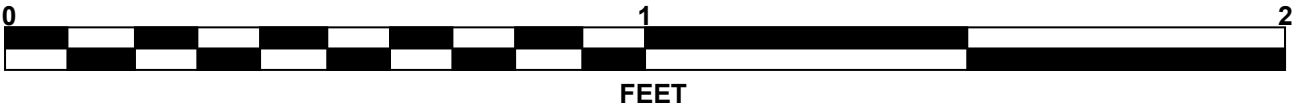
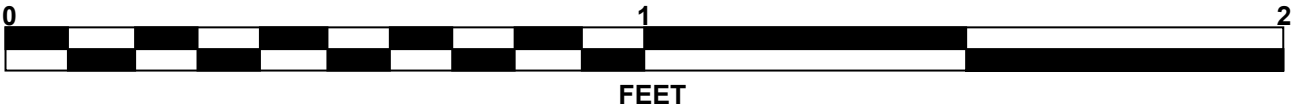
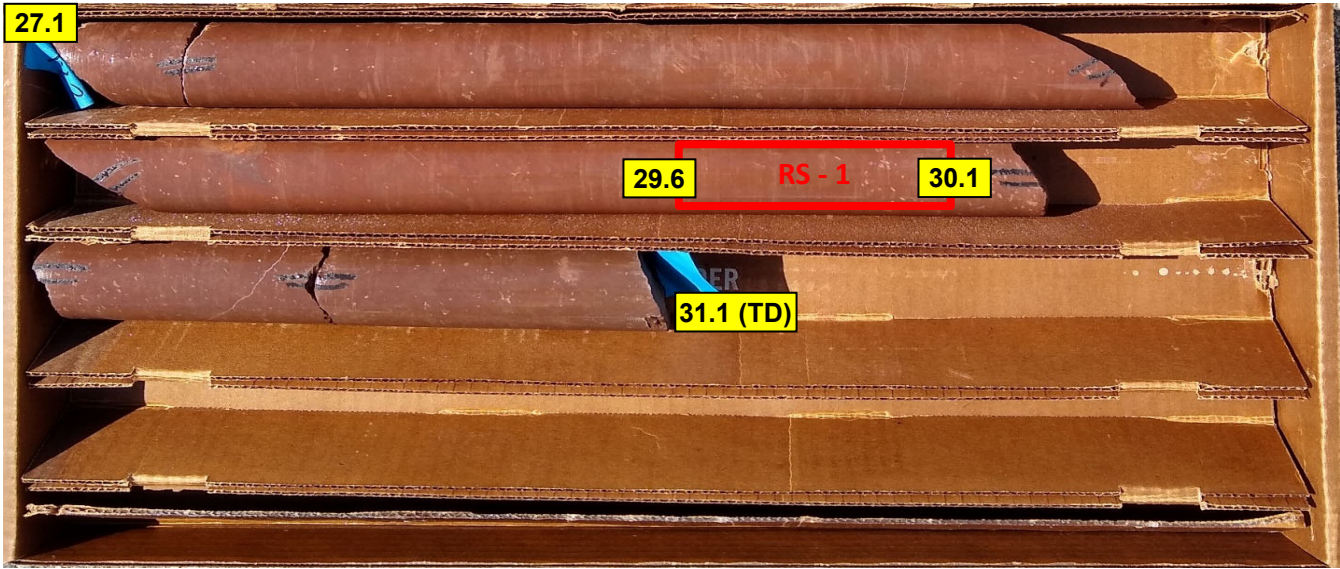
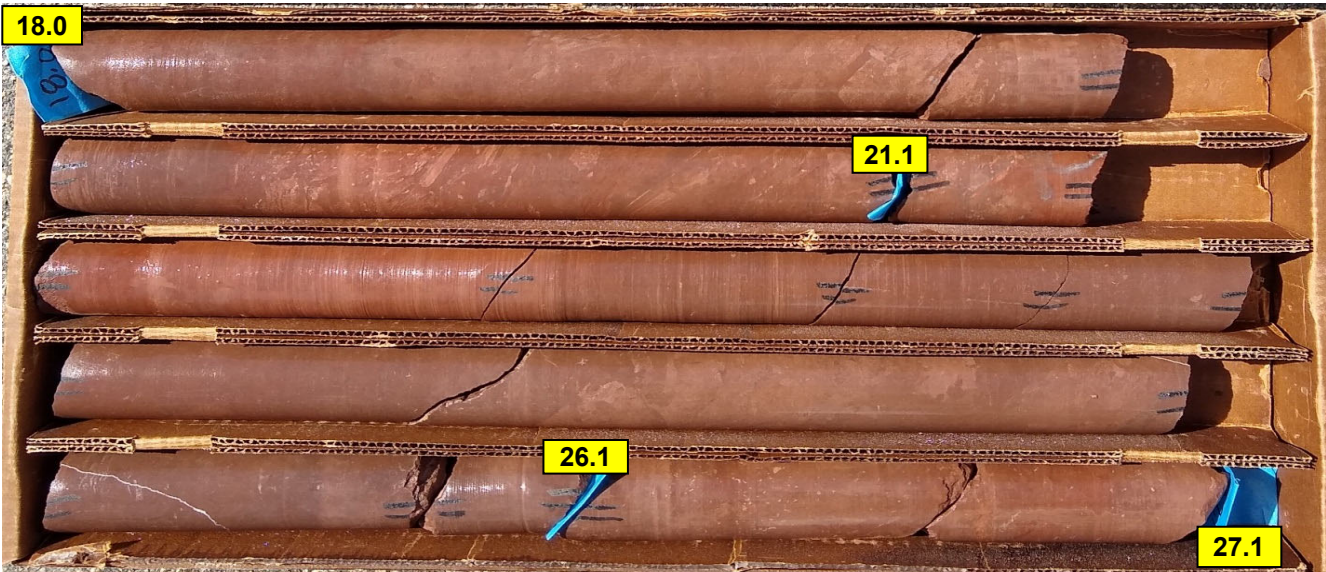
B1-A

BOX 1 of 3: 8.7 - 18.0 FEET



B1-A

BOXES 2 & 3 of 3: 18.0 - 31.1 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

[illegible]

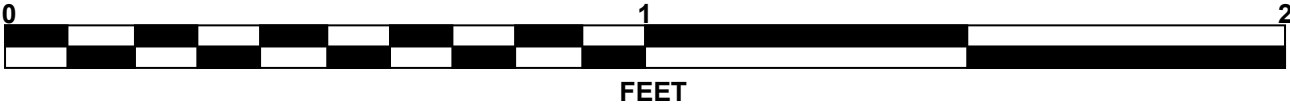
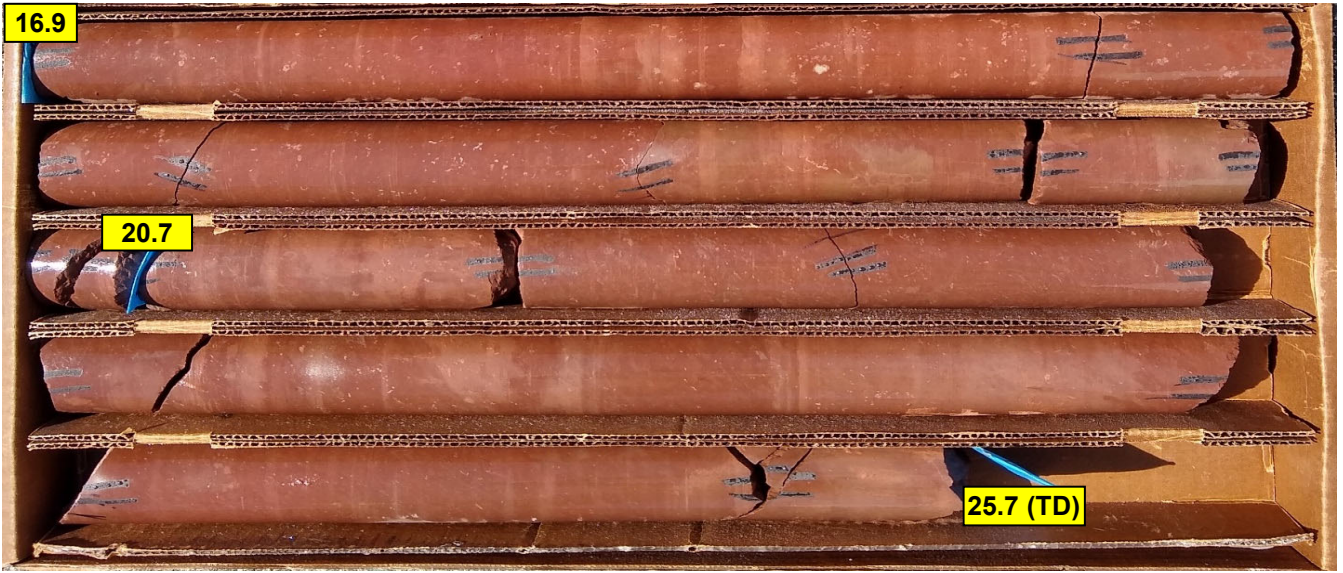
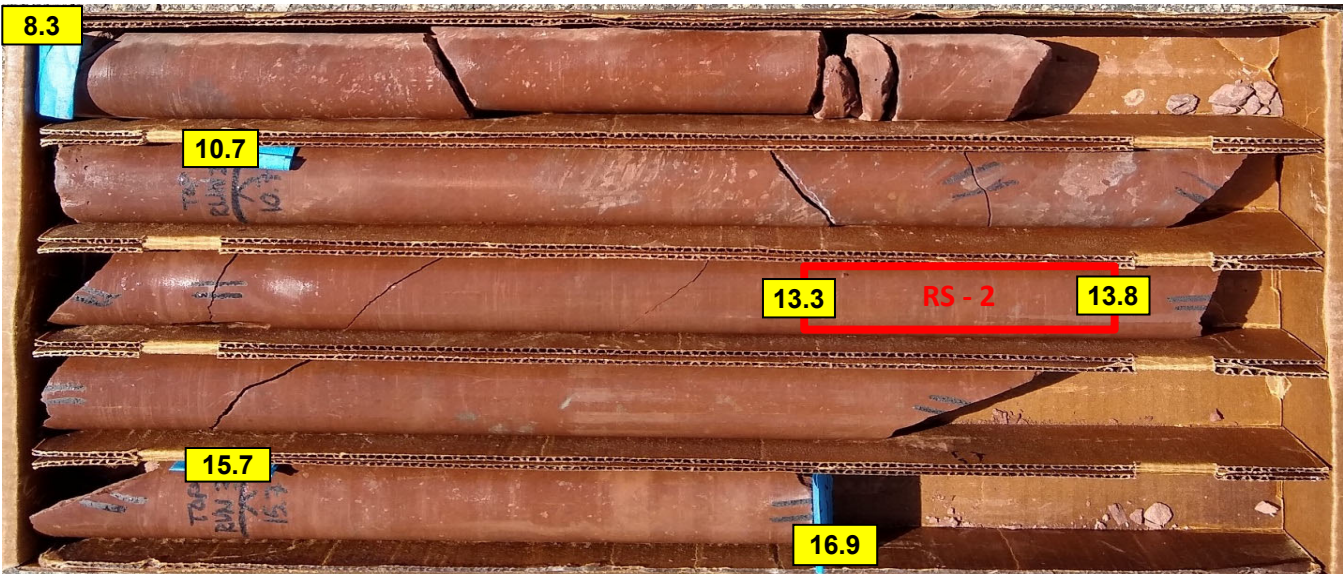
GEOTECHNICAL BORING REPORT

CORE LOG

WBS 46860.1.1				TIP I-5898				COUNTY ROCKINGHAM				GEOLOGIST J. Howard					
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)												GROUND WTR (ft)					
BORING NO. B1-B				STATION 119+68				OFFSET 42 ft RT				ALIGNMENT -Y-				0 HR. 4.7	
COLLAR ELEV. 673.5 ft				TOTAL DEPTH 25.7 ft				NORTHING 971,912				EASTING 1,723,949				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020								DRILL METHOD Core Boring				HAMMER TYPE Automatic					
DRILLER S. Hardee				START DATE 04/06/21				COMP. DATE 04/06/21				SURFACE WATER DEPTH N/A					
CORE SIZE NQ				TOTAL RUN 17.4 ft													
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	ROD (ft) %	SAMP. NO.	REC. (ft) %	ROD (ft) %	LOG	DESCRIPTION AND REMARKS				DEPTH (ft)		
665.2	665.2	8.3	2.4	N=60 2:00 1:45 0.45/0.4	(1.9) 79%	(1.5) 63%		(1.6) 100%	(1.2) 75%		Begin Coring @ 8.3 ft				8.3		
	662.8	10.7	5.0	2:00 1:45 2:15 2:15 1:45	(5.0) 100%	(5.0) 100%		(0.0) 0%	(0.0) 0%		NON-CRYSTALLINE ROCK Red-brown, slight to very slight weathering, very close to close fracturing, indurated, moderately hard to hard, MUDSTONE (Triassic Basin) (GSI = 30 to 40)				9.9		
660	657.8	15.7	5.0	2:00 1:45 2:00 2:15	(5.0) 100%	(5.0) 100%	RS-2	(15.3) 100%	(15.3) 100%		3 joints at 10-20°; 2 joints at 40°				10.4		
											WEATHERED ROCK No recovery, MUDSTONE (Triassic Basin)						
655	652.8	20.7	5.0	2:00 1:30 2:00 2:15	(5.0) 100%	(5.0) 100%					NON-CRYSTALLINE ROCK Red-brown, very slight weathering to fresh, moderately close to wide fracturing, indurated, hard, MUDSTONE (Triassic Basin) (GSI = 30 to 40)						
650	647.8	25.7		2:45 2:00 2:30 2:45	(5.0) 100%	(5.0) 100%					1 joint at 10°; 4 joints at 40-45°						
											Boring Terminated at Elevation 647.8 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin)				25.7		

CORE PHOTOGRAPHS

B1-B
BOXES 1 & 2 of 2: 8.3 - 25.7 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1			TIP I-5898			COUNTY ROCKINGHAM			GEOLOGIST J. Howard				
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)									GROUND WTR (ft)				
BORING NO. EB2-A			STATION 120+73			OFFSET 6 ft LT			ALIGNMENT -Y-				
COLLAR ELEV. 682.5 ft			TOTAL DEPTH 15.8 ft			NORTHING 972,002			EASTING 1,724,020				
									0 HR. Dry				
									24 HR. Dry				
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER S. Hardee			START DATE 04/01/21			COMP. DATE 04/01/21			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft) DEPTH (ft)
685													
680	682.5	0.0	1	2	4					M		682.5 GROUND SURFACE 0.0	
	679.0	3.5	4	5	12							682.5 TRIASSIC RESIDUAL Medium stiff to very stiff, moist, red-brown, fine sandy, silty CLAY (A-6)	
675													
670	674.0	8.5	28	72/0.2						100/0.7			674.5 WEATHERED ROCK 8.0 Red-brown, MUDSTONE (Triassic Basin)
	669.9	12.6	100/0.1							100/0.1			669.5 NON-CRYSTALLINE ROCK 13.0 Red-brown, MUDSTONE (Triassic Basin)
	666.7	15.8	60/0.0							60/0.0			666.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 666.7 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin) 15.8

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1				TIP I-5898				COUNTY ROCKINGHAM				GEOLOGIST J. Howard					
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)												GROUND WTR (ft)					
BORING NO. EB2-B				STATION 120+59				OFFSET 50 ft RT				ALIGNMENT -Y-				0 HR. Dry	
COLLAR ELEV. 692.1 ft				TOTAL DEPTH 23.4 ft				NORTHING 971,946				EASTING 1,724,034				24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SME1524 CME-45B 84% 02/17/2021								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic					
DRILLER S. Hardee				START DATE 05/10/21				COMP. DATE 05/10/21				SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)			
695																	
690	690.6	1.5												692.1	GROUND SURFACE 0.0		
	688.8	3.3	8	4	5									690.8	ASPHALT (0.0-0.6'), ABC stone (0.6-1.3') 1.3		
685			3	4	5									ROADWAY EMBANKMENT			
														Stiff, dry, red-brown, fine to coarse sandy, silty CLAY (A-6)			
680	683.8	8.3	3	6	8									683.3	TRIASSIC RESIDUAL 8.8		
	678.8	13.3	7	8	14									Stiff to very stiff, dry, orange-tan to red-brown, fine sandy, clayey SILT (A-4)			
675														675.1	17.0		
	673.8	18.3	8	18	31									Hard, dry, red-brown, fine sandy, silty CLAY (A-6)			
670														671.1	21.0		
	668.8	23.3	60/0.1											668.8	Red-brown, MUDSTONE (Triassic Basin) 23.3		
														668.7	Red-brown, MUDSTONE (Triassic Basin) 23.4		
														NON-CRYSTALLINE ROCK			
														Red-brown, MUDSTONE (Triassic Basin)			
														Boring Terminated with Standard Penetration Test Refusal at Elevation 668.7 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin)			

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

GEOTECHNICAL BORING REPORT

BORE LOG

[illegible]

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 46860.1.1

TIP I-5898

COUNTY ROCKINGHAM

GEOLOGIST J. Howard

SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)

GROUND WTR (ft)

BORING NO. WALL1_END

STATION 119+37

OFFSET 79 ft LT

ALIGNMENT -Y-

0 HR. Dry

COLLAR ELEV. 675.5 ft

TOTAL DEPTH 5.2 ft

NORTHING 972,005

EASTING 1,723,866

24 HR. FIAD

DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020

DRILL METHOD H.S. Augers

HAMMER TYPE Automatic

DRILLER S. Hardee

START DATE 04/07/21

COMP. DATE 04/07/21

SURFACE WATER DEPTH N/A

ELEV (ft)

DRIVE ELEV (ft)

DEPTH (ft)

BLOW COUNT

0.5ft0.5ft0.5ft

BLOWS PER FOOT

0255075100

SAMP. NO.

MOI

LOG

SOIL AND ROCK DESCRIPTION

ELEV. (ft)

DEPTH (ft)

680

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1				TIP I-5898				COUNTY ROCKINGHAM				GEOLOGIST M. Lear				
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)												GROUND WTR (ft)				
BORING NO. WALL2_BEGIN				STATION 120+23				OFFSET 110 ft RT				ALIGNMENT -Y-				
COLLAR ELEV. 685.0 ft				TOTAL DEPTH 21.6 ft				NORTHING 971,876				EASTING 1,724,029				
				0 HR. Dry								24 HR. Dry				
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic				
DRILLER S. Hardee				START DATE 03/30/21				COMP. DATE 03/30/21				SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
685	685.0	0.0	2	3	4								685.0	GROUND SURFACE 0.0		
680	681.5	3.5	4	6	9							M	683.0	TRIASSIC RESIDUAL 2.0		
	678.0	7.0												M	Medium stiff, moist, red-brown, silty CLAY (A-6), with trace rock fragments	
675	676.5	8.5	9	15	23								678.0	Stiff, moist, orange-brown, fine sandy, silty CLAY (A-7-5) 7.0		
	671.5	13.5	27	31	32									Hard, dry, light brown to red-brown, fine sandy, clayey SILT (A-4)		
670	666.5	18.5	65	35/0.2									668.0	WEATHERED ROCK 17.0		
	663.5	21.5													Red-brown, MUDSTONE (Triassic Basin)	
665	663.5	21.5	60/0.1										663.5	NON-CRYSTALLINE ROCK 21.5		
													663.4	Red-brown, MUDSTONE (Triassic Basin) 21.6		
														Boring Terminated with Standard Penetration Test Refusal at Elevation 663.4 ft in Non-Crystalline Rock: MUDSTONE (Triassic Basin)		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46860.1.1			TIP I-5898			COUNTY ROCKINGHAM			GEOLOGIST J. Howard					
SITE DESCRIPTION I-5898: Bridge on NC 135 (-Y-) over US 220 (-L-)									GROUND WTR (ft)					
BORING NO. WALL2_END			STATION 120+94			OFFSET 96 ft LT			ALIGNMENT -Y-					
COLLAR ELEV. 679.2 ft			TOTAL DEPTH 15.6 ft			NORTHING 972,092			EASTING 1,723,997					
			0 HR. Dry						24 HR. 11.7					
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 80% 12/03/2020						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER S. Hardee			START DATE 04/01/21			COMP. DATE 04/01/21			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft) DEPTH (ft)
680														
	679.2	0.0	2	2	4									679.2 GROUND SURFACE 0.0
	675.7	3.5	3	5	7									
675														
	670.7	8.5	7	13	17									672.2 Very stiff, dry, red-tan, gray, sandy SILT (A-4), saprolitic 7.0
670														
	665.7	13.5	80	20/0.1										665.7 WEATHERED ROCK 13.5
665														
	663.6	15.6	60/0.0											663.6 MUDSTONE (Triassic Basin) 15.6

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

NC DOT BORE SINGLE I5898_GEO_RDWY_AS DRILLED BORINGS.GPJ NC_DOT.GDT 10/20/21

I-5898: BRIDGE ON NC 135 (-Y-) OVER US 220 (-L-)

ROCK TEST RESULTS									
BORING I.D.	SAMPLE NO.	OFFSET (ft)	STATION	DEPTH INTERVAL (ft)	UNIT Wt. (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (Mpsi)	GEOLOGICAL STRENGTH INDEX (GSI)	ROCK TYPE
B1-A	RS-1	19 LT	119+97	29.6 - 30.1	174.2	11920	ND	30-40	Mudstone (Triassic Basin)
B1-B	RS-2	42 RT	119+68	13.3 - 13.8	172.2	4180	ND	30-40	Mudstone (Triassic Basin)

ND=Not Determined



UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: Wood, PLC

Client Project: I-5898

Project No.: R-2021-192-001

Lab ID No.: R-2021-192-001-001

Boring No.: B1-A

Depth (ft): 29.6-30.1

Sample ID: RS-1

Moisture Condition: As received

Specimen Weight (g): 626.75

SPECIMEN LENGTH (in)

Reading 1: 4.43

Reading 2: 4.44

Reading 3: 4.42

Average: 4.43

SPECIMEN DIAMETER (in):

Reading 1: 1.98

Reading 2: 1.98

Average: 1.98

Area (in²): 3.07

L/D: 2.24

MOISTURE CONTENT

Tare Number: 443

Wt. of Tare & Wet Sample (g): 652.04

Wt. of Tare & Dry Sample (g): 648.15

Weight of Tare (g): 99.24

Weight of Wet Sample (g): 552.80

Sample Volume (cm³): 222.98

Moisture Content (%): 0.71

Unit Wet Weight (g/cm³): 2.811

Unit Wet Weight (pcf): 175.4

Unit Dry Weight (g/cm³): 2.791

Unit Dry Weight (pcf): 174.2

Total Load (lb): 36,600

Uniaxial Compressive Strength (psi): 11,920

Fracture Type: Shear

Rate of Loading (lb/sec): 257

Time to Break (min:sec): 2:22.32

Deviation From Straightness²: Fail

AXIAL: Pass

TOP: Pass

BOTTOM: Pass

Physical Description: Red Siltstone

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:
R176 Compression Machine,
R525 Digital Calipers,
R148 Feeler Gauge, R419 Scale
R512 Rock Saw
R148 Straight Edge
R582 V-Block, R585 Dial Gauge



Tested By: 129-07-0411

7/14/21

Checked By: GEM

Date: 7/19/21

UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: Wood, PLC

Client Project: I-5898

Project No.: R-2021-192-001

Lab ID No.: R-2021-192-001-002

Boring No.: B1-B

Depth (ft): 13.3-13.8

Sample ID: RS-2

Moisture Condition: As received

Specimen Weight (g): 636.99

SPECIMEN LENGTH (in)

Reading 1: 4.56

Reading 2: 4.55

Reading 3: 4.56

Average: 4.56

SPECIMEN DIAMETER (in):

Reading 1: 1.98

Reading 2: 1.98

Average: 1.98

Area (in²): 3.07

L/D: 2.30

MOISTURE CONTENT

Tare Number: 716

Wt. of Tare & Wet Sample (g): 704.90

Wt. of Tare & Dry Sample (g): 700.30

Weight of Tare (g): 90.97

Weight of Wet Sample (g): 613.93

Sample Volume (cm³): 229.05

Moisture Content (%): 0.75

Unit Wet Weight (g/cm³): 2.781

Unit Wet Weight (pcf): 173.5

Unit Dry Weight (g/cm³): 2.760

Unit Dry Weight (pcf): 172.2

Total Load (lb): 12,810

Uniaxial Compressive Strength (psi): 4,180

Fracture Type: Shear

Rate of Loading (lb/sec): 236

Time to Break (min:sec): 0:54.32

Deviation From Straightness²: Fail

AXIAL: Pass

TOP: Pass

BOTTOM: Pass

Physical Description: Red Siltstone

Notes:

- 1) Moisture conditions at time of the test are: As received
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08
Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
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I-5898/ Bridge on NC-135 (-Y-) over US-220 (-L-)

SITE PHOTOGRAPH

