

REFERENCE: SF-890092

PROJECT: BPI0.R022

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

STRUCTURE  
SUBSURFACE INVESTIGATION

COUNTY UNION  
PROJECT DESCRIPTION REPLACE BRIDGE NO. 92  
OVER BEAVERDAM CREEK ON SR 1903  
(GILBOA ROAD)

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SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5	CROSS SECTIONS
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II	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-890092	1	

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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.

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  - 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

J. KARDON

TRIGON EXPLORATION

INVESTIGATED BY J. KARDON


DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

DATE OCTOBER 2022

Prepared in the Office of:



**KLEINFELDER**  
Bright People. Right Solutions.  
422 GALLIMORE DAIRY ROAD, SUITE B  
GREENSBORO, NORTH CAROLINA 27409  
NC ENGINEERING FIRM LICENSE NO. F-1312



DocuSigned by:  
Thomas R. Wells 11/03/2022  
7DA5D2D0518E480 SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

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

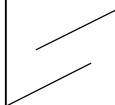
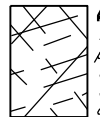
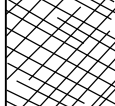
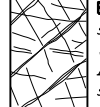

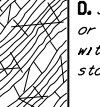
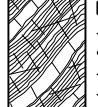




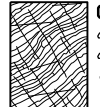
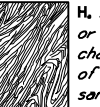


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**SUBSURFACE INVESTIGATION**

**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)

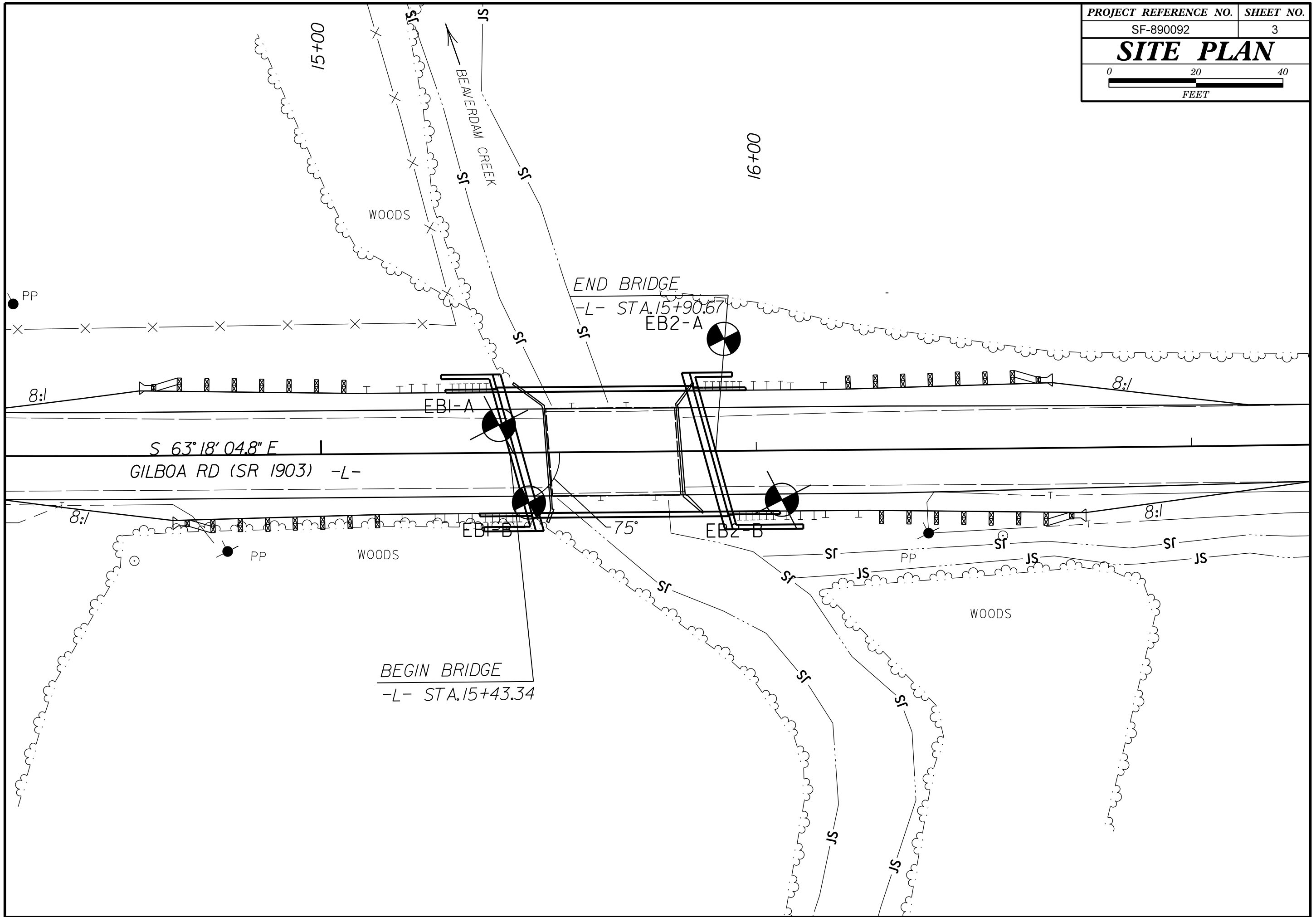
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)	SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
<p>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.</p>	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	<p>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.</p>	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	DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE				
 INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A	 <b>A.</b> 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.	70				
 BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80					 <b>B.</b> Sandstone with thin inter-layers of siltstone  <b>C.</b> Sandstone and siltstone in similar amounts  <b>D.</b> Siltstone or silty shale with sandstone layers  <b>E.</b> Weak siltstone or clayey shale with sandstone layers	60				
 VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70					50				
 BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60				 <b>F.</b> Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure	40				
 DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces		50			 <b>G.</b> Undisturbed silty or clayey shale with or without a few very thin sandstone layers  <b>H.</b> Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.		30				
 LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes		40					20				
		30					10				
		20									
		10									
		N/A									
		N/A									

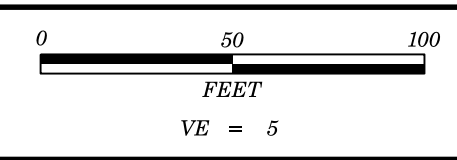
→ Means deformation after tectonic disturbance

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
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**SUBSURFACE INVESTIGATION**  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

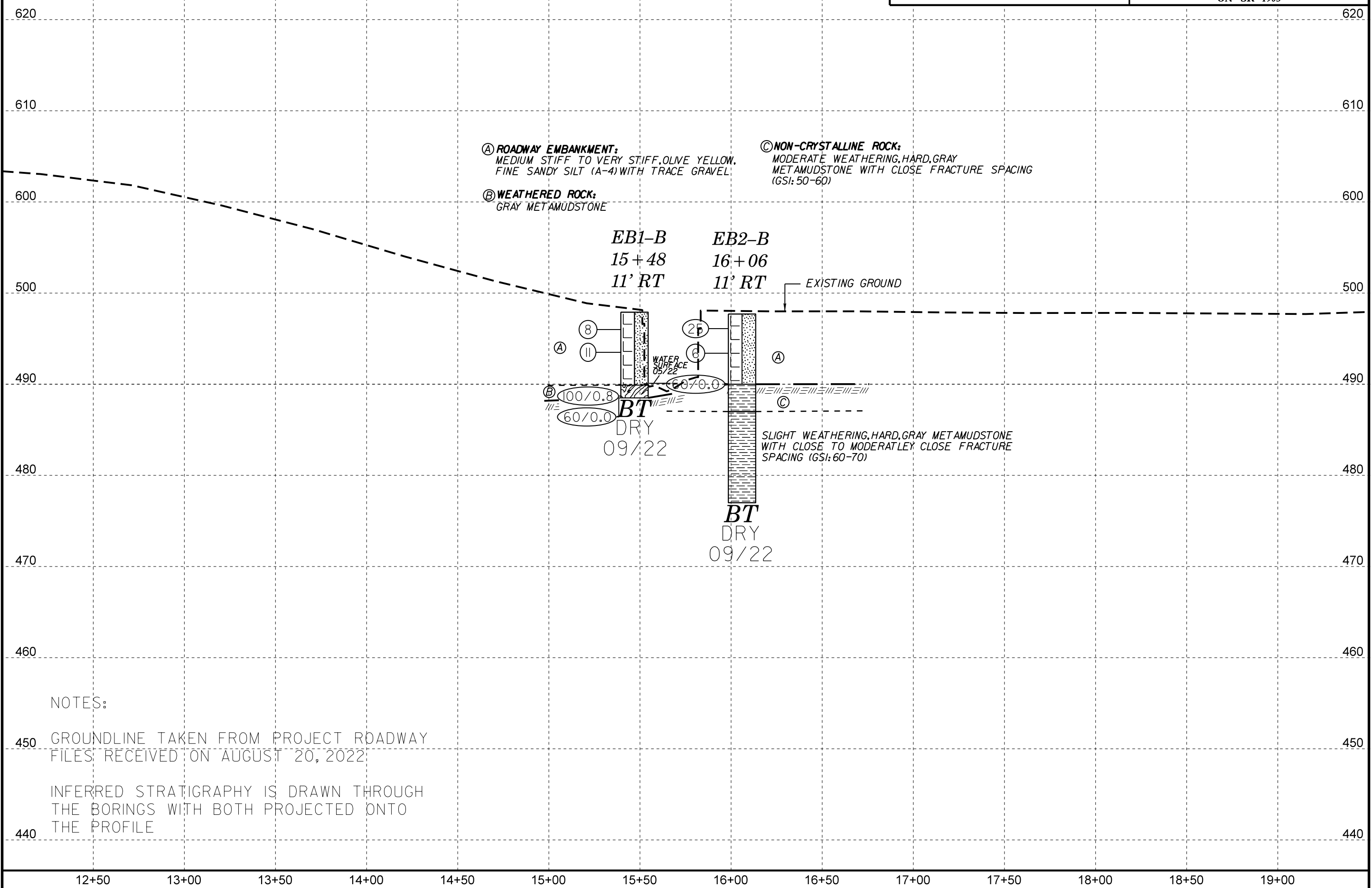
SOIL DESCRIPTION												GRADATION												ROCK DESCRIPTION												TERMS AND DEFINITIONS																																																																																																																																																																																				
SOIL IS CONSIDERED UNCONSOLIDATED, 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 209; 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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6												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: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)												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 (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 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 EMPLOYED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED 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 (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY 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																																																																																																																																																																																																
<table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="6">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="6">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="4">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-2</th> <th>A-3</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1</th> <th>A-2</th> <th>A-3</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> <td>50 30 15</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td colspan="6">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="4">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="6">EXCELLENT TO GOOD</td> <td colspan="6">FAIR TO POOR</td> <td colspan="2">FAIR TO POOR</td> <td colspan="2">POOR</td> <td colspan="2">UNSUITABLE</td> </tr> <tr> <td colspan="18">PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</td> </tr> </table>												GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS				GROUP CLASS.	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	SYMBOL																		% PASSING #10 #40 #200	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	50 30 15	MATERIAL PASSING #40 LL PI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER						HIGHLY ORGANIC SOILS				GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR		POOR		UNSUITABLE		PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																		<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> <p><b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p><b>COMPRESSIBILITY</b> SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p> <p><b>PERCENTAGE OF MATERIAL</b></p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt; 10%</td> <td>&gt; 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table> <p><b>GROUND WATER</b></p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p> <p><b>MISCELLANEOUS SYMBOLS</b></p> <p> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p> SOIL SYMBOL</p> <p> ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p> INFERRED SOIL BOUNDARY</p> <p> INFERRED ROCK LINE</p> <p> ALLUVIAL SOIL BOUNDARY</p> <p> DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</p> <p> SPT TEST BORING</p> <p> AUGER BORING</p> <p> CORE BORING</p> <p> MONITORING WELL</p> <p> PIEZOMETER INSTALLATION</p> <p> SLOPE INDICATOR INSTALLATION</p> <p> CONE PENETROMETER TEST</p> <p> SOUNDING ROD</p> <p> TEST BORING WITH CORE</p> <p> SPT N-VALUE</p>												ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<p><b>ROCK HARDNESS</b></p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD CAN BE GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>SOFT CAN BE GROUDED 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 PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</p>											
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS																																																																																																																																																																																																											
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<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
SF-890092	4
<b>PROFILE ON BRIDGE NO. 92 OVER BEAVERDAM CREEK ON SR 1903</b>	



Ⓐ **ROADWAY EMBANKMENT:**  
MEDIUM STIFF TO VERY STIFF, OLIVE YELLOW,  
FINE SANDY SILT (A-4) WITH TRACE GRAVEL.

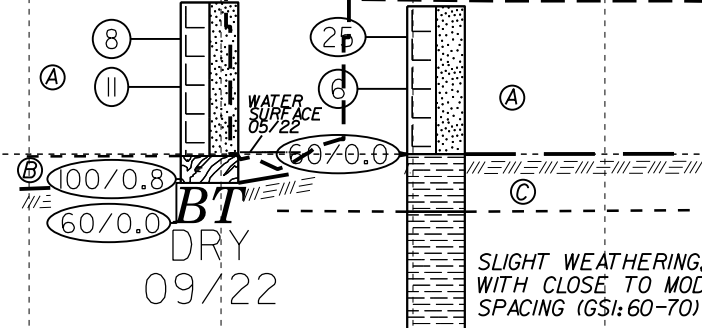
Ⓑ **WEATHERED ROCK:**  
GRAY METAMUDSTONE

Ⓒ **NON-CRYSTALLINE ROCK:**  
MODERATE WEATHERING, HARD, GRAY  
METAMUDSTONE WITH CLOSE FRACTURE SPACING  
(GSI: 50-60)

**EB1-B**  
15+48  
11' RT

**EB2-B**  
16+06  
11' RT

EXISTING GROUND



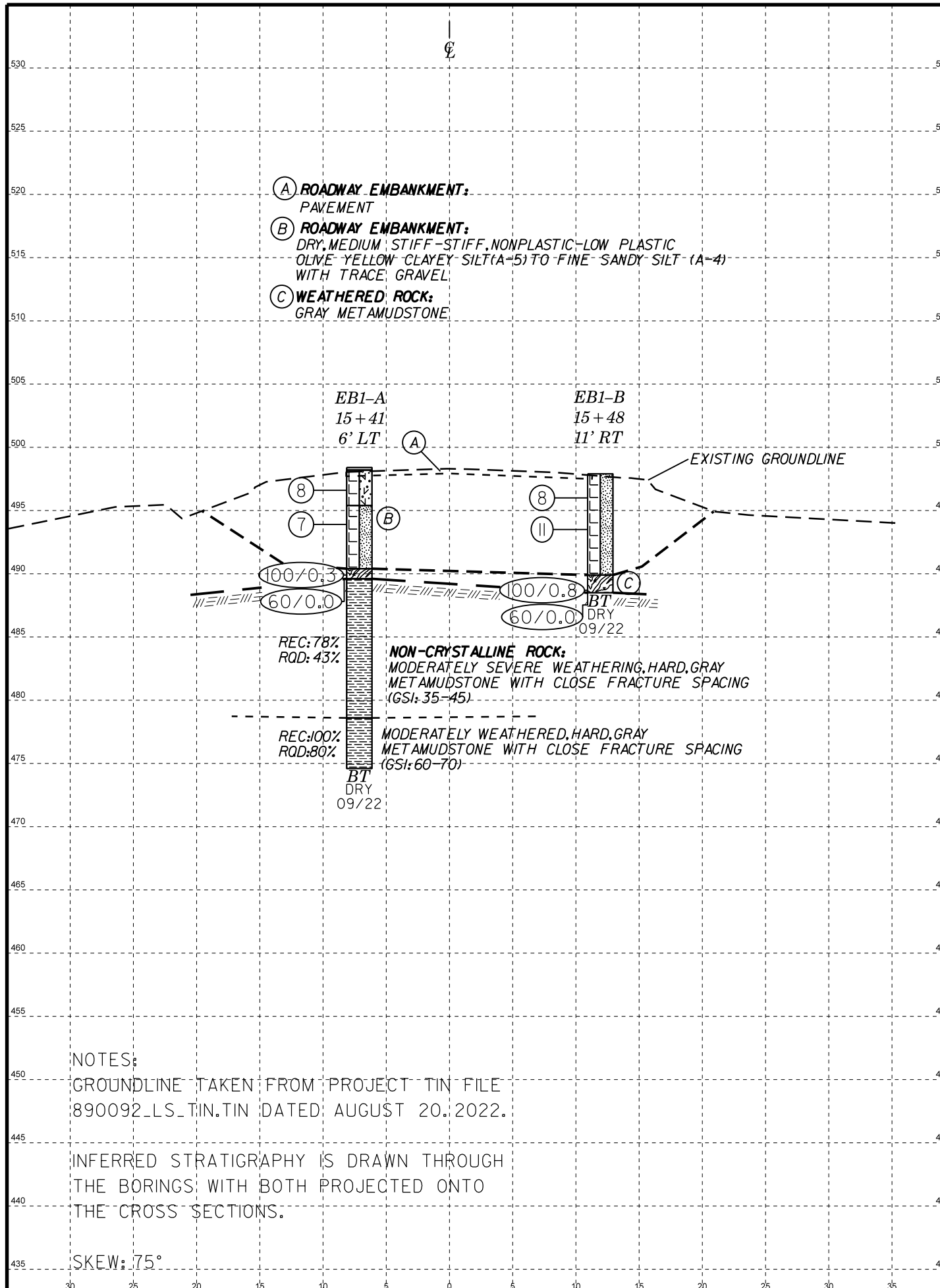
SLIGHT WEATHERING, HARD, GRAY METAMUDSTONE  
WITH CLOSE TO MODERATELY CLOSE FRACTURE  
SPACING (GSI: 60-70)

**BT**  
DRY  
09/22

**NOTES:**

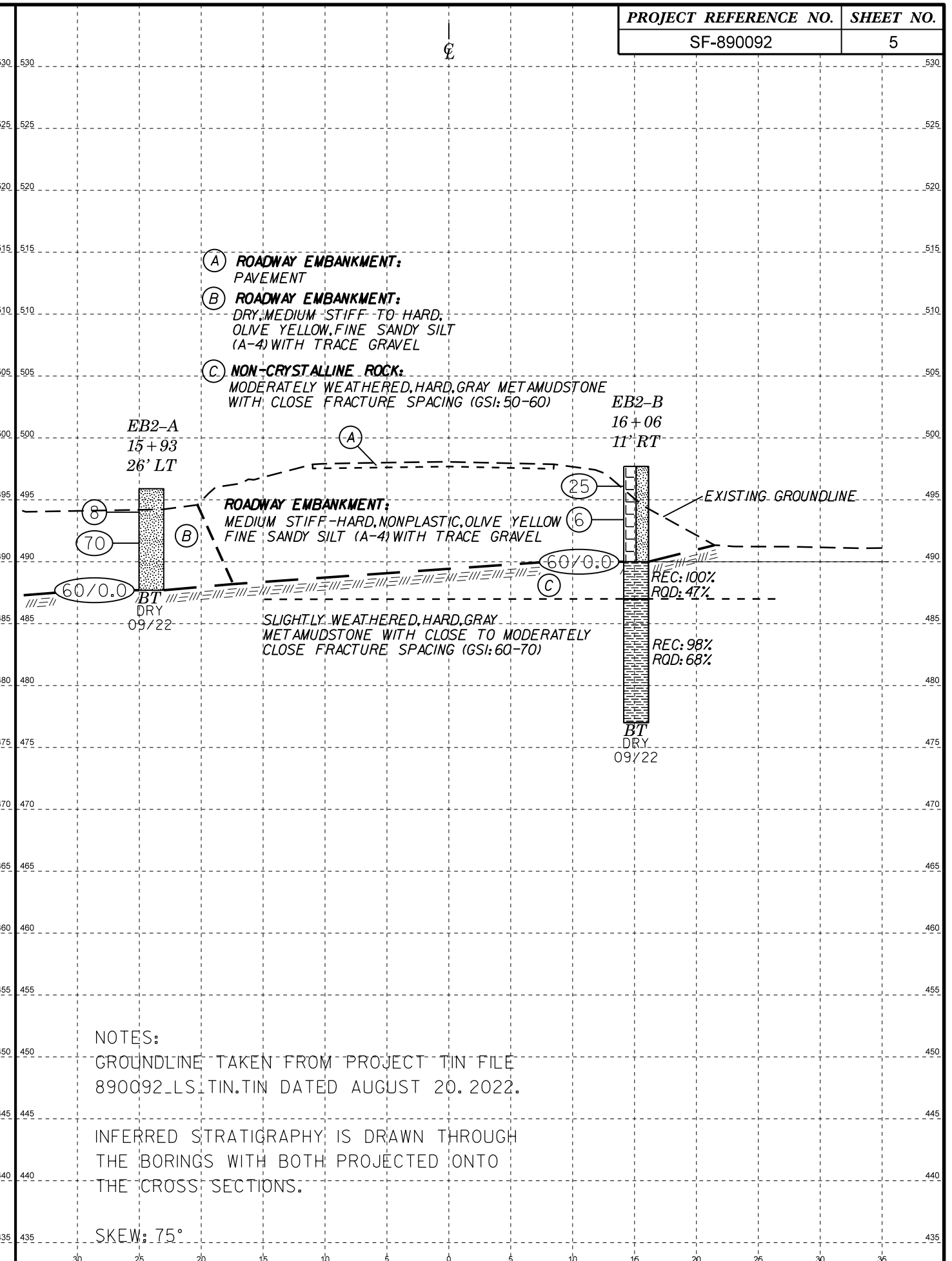
GROUNDLINE TAKEN FROM PROJECT ROADWAY  
FILES RECEIVED ON AUGUST 20, 2022

INFERRED STRATIGRAPHY IS DRAWN THROUGH  
THE BORINGS WITH BOTH PROJECTED ONTO  
THE PROFILE



HORIZ. SCALE 0 10 20 (FEET) VE = 1

**CROSS SECTION ALONG  
END BENT NO. 1 AT STA. 15+43.50**



HORIZ. SCALE 0 10 20 (FEET) VE = 1

**CROSS SECTION ALONG  
END BENT NO. 2 AT STA. 15+90.67**

# GEOTECHNICAL BORING REPORT

## BORE LOG

# GEOTECHNICAL BORING REPORT

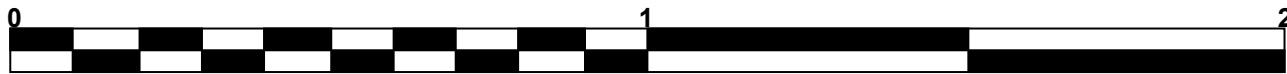
## CORE LOG

WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.									
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 15+41		OFFSET 6 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 498.4 ft		TOTAL DEPTH 23.8 ft		NORTHING 436,826		EASTING 1,580,509									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022				DRILL METHOD HSA/NQ Core		HAMMER TYPE Automatic									
DRILLER Toothman, R.		START DATE 09/15/22		COMP. DATE 09/15/22		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					
500															
	497.6	0.8	8	4	4									488.4	GROUND SURFACE
															ROADWAY EMBANKMENT
															Asphalt
495	494.9	3.5	4	4	3									495.4	Olive Yellow, Clayey SILT (A-5)
															Olive Yellow, Fine Sandy SILT (A-4) with Trace Gravel
490	490.2	8.2												490.4	WEATHERED ROCK
	489.6	8.8	100/0.3											489.6	Gray METAMUDSTONE
															NON-CRYSTALLINE ROCK
															Gray METAMUDSTONE
485															
480															
475															
															Boring Terminated at Elevation 474.6 ft in Non-Crystalline Rock: METAMUDSTONE

WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.						
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)					
BORING NO. EB1-A		STATION 15+41		OFFSET 6 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 498.4 ft		TOTAL DEPTH 23.8 ft		NORTHING 436,826		EASTING 1,580,509						
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022				DRILL METHOD HSA/NQ Core		HAMMER TYPE Automatic						
DRILLER Toothman, R.		START DATE 09/15/22		COMP. DATE 09/15/22		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 15.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
489.6	489.6	8.8	2.0	N=60/0.0 3:12/1.0 4:57/1.0	(1.6)	(0.9)		(8.6)	(4.3)		Begin Coring @ 8.8 ft	8.8
	487.6	10.8	5.0	3:53/1.0 4:50/1.0 2:58/1.0 3:14/1.0 5:53/1.0	(4.0)	(2.5)					NON-CRYSTALLINE ROCK	
											Moderately Severe Weathering, Hard, Gray METAMUDSTONE with Close Fracture Spacing (GSI: 35-45)	
485												
	482.6	15.8	5.0	5:24/1.0 5:47/1.0 2:43/1.0 8:36/1.0 4:28/1.0	(4.0)	(1.8)						
480												
	477.6	20.8	3.0	4:17/1.0 3:49/1.0 3:47/1.0	(3.0)	(2.3)		(4.0)	(3.2)		Moderate Weathering, Hard, Gray METAMUDSTONE with Close Fracture Spacing (GSI: 60-70)	19.8
475	474.6	23.8										23.8
											Boring Terminated at Elevation 474.6 ft in Non-Crystalline Rock: METAMUDSTONE	

# CORE PHOTOGRAPHS

**EB1-A**  
BOXES 1 & 2: 8.8 - 23.8 FEET



FEET

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.									
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 15+48		OFFSET 11 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 497.9 ft		TOTAL DEPTH 9.4 ft		NORTHING 436,807		EASTING 1,580,507									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Toothman, R.		START DATE 09/14/22		COMP. DATE 09/14/22		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					
500															
	497.0	0.9	2	4	4									497.9	0.0
	GROUND SURFACE ROADWAY EMBANKMENT Olive Yellow, Fine Sandy SILT (A-4)														
495	494.5	3.4	6	5	6										
	RESIDUAL Olive Yellow, Fine Sandy SILT (A-4) with Trace Rock Fragments														
490	489.5	8.4	24	76	0.3									489.9	8.0
	488.5	9.4	60	0.0										488.5	9.4
	WEATHERED ROCK Gray METAMUDSTONE														
	Boring Terminated with Standard Penetration Test Refusal at Elevation 488.5 ft on Non-Crystalline Rock: METAMUDSTONE														

WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.									
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 15+93		OFFSET 26 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 495.9 ft		TOTAL DEPTH 8.2 ft		NORTHING 436,820		EASTING 1,580,564									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Toothman, R.		START DATE 09/15/22		COMP. DATE 09/15/22		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					
500															
	495.9	0.0												495.9	0.0
	GROUND SURFACE RESIDUAL Olive Yellow, Fine Sandy SILT (A-4) with Trace Rock Fragments														
495	495.0	0.9	5	4	4										
	RESIDUAL Olive Yellow, Fine Sandy SILT (A-4) with Trace Rock Fragments														
490	492.5	3.4	12	39	31										
	RESIDUAL Olive Yellow, Fine Sandy SILT (A-4) with Trace Rock Fragments														
	487.7	8.2	60	0.0										487.7	8.2
	Boring Terminated with Standard Penetration Test Refusal at Elevation 487.7 ft on Non-Crystalline Rock: METAMUDSTONE														

NCDOT BORE DOUBLE SF-890092\_GEO\_RDWY.GPJ NC\_DOT.GDT 10/26/22

# GEOTECHNICAL BORING REPORT

## BORE LOG

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## CORE LOG

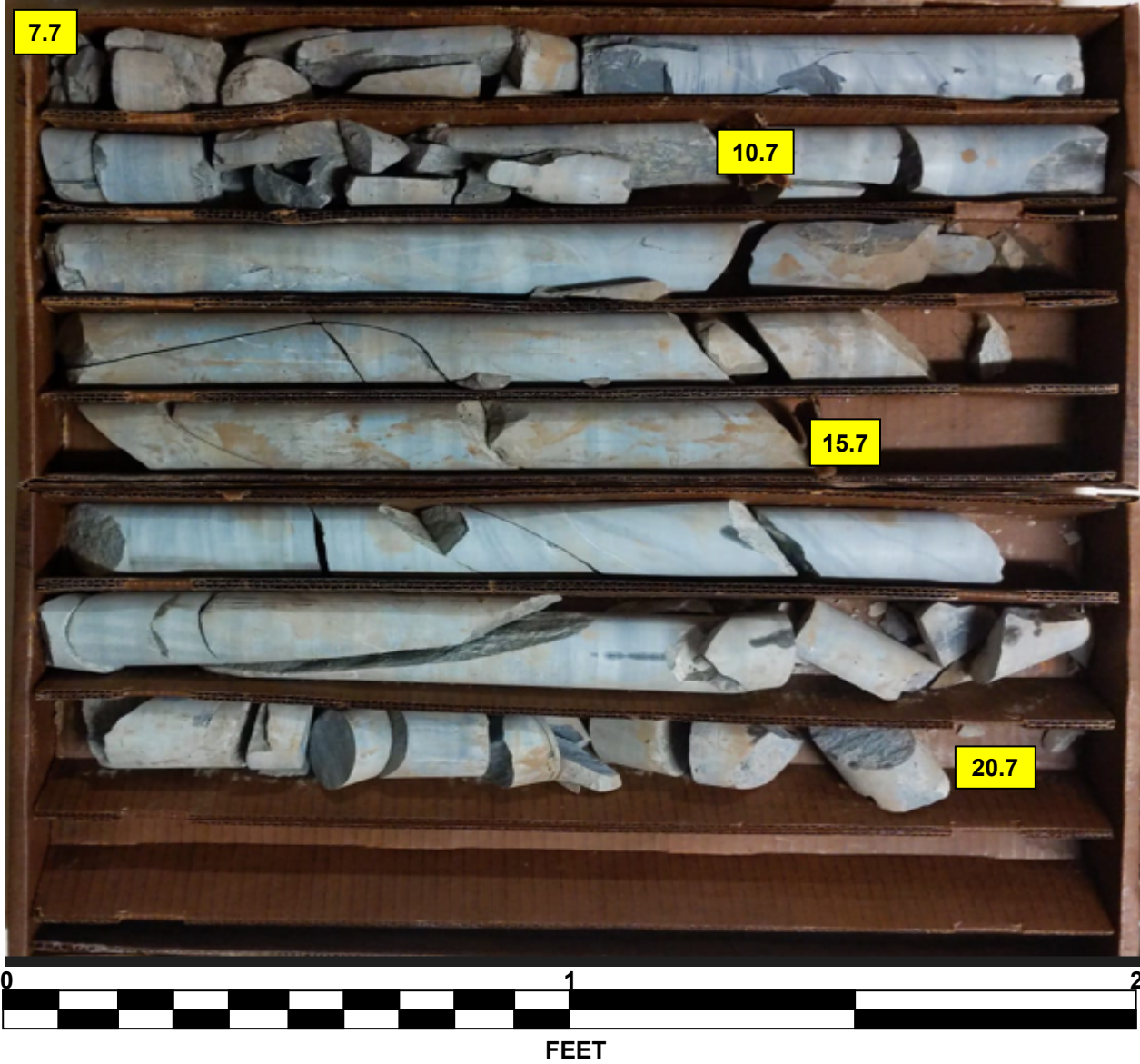
WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.									
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 16+06		OFFSET 11 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 497.7 ft		TOTAL DEPTH 20.7 ft		NORTHING 436,781		EASTING 1,580,559									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022				DRILL METHOD HSA/NQ Core		HAMMER TYPE Automatic									
DRILLER Toothman, R.		START DATE 09/14/22		COMP. DATE 09/14/22		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					
500															
	497.1	0.6	12	12	13									497.7	GROUND SURFACE
495	494.4	3.3	5	3	3									490.0	ROADWAY EMBANKMENT Olive Yellow, Fine Sandy SILT (A-4) with Trace Gravel
490	490.0	7.7	60/0.0											490.0	NON-CRYSTALLINE ROCK Gray METAMUDSTONE
485														487.0	Gray METAMUDSTONE
480														477.0	Boring Terminated at Elevation 477.0 ft in Non-Crystalline Rock: METAMUDSTONE

WBS BP10.R022.1		TIP SF-890092		COUNTY UNION		GEOLOGIST Kardon, J. L.					
SITE DESCRIPTION Bridge No 92 over Beaverdam Creek on SR 1903 (Gilboa Road)							GROUND WTR (ft)				
BORING NO. EB2-B		STATION 16+06		OFFSET 11 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 497.7 ft		TOTAL DEPTH 20.7 ft		NORTHING 436,781		EASTING 1,580,559					
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 83% 05/09/2022				DRILL METHOD HSA/NQ Core		HAMMER TYPE Automatic					
DRILLER Toothman, R.		START DATE 09/14/22		COMP. DATE 09/14/22		SURFACE WATER DEPTH N/A					
CORE SIZE NQ				TOTAL RUN 13.0 ft							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)			
490	490.0	7.7	3.0	N=60/0.0 7:37/1.0 7:12/1.0 3:31/1.0	(3.0)	(1.4)	(3.0)	(1.4)		Begin Coring @ 7.7 ft	7.7
	487.0	10.7	5.0	3:30/1.0 2:38/1.0 2:43/1.0 3:35/1.0 3:53/1.0	(5.0)	(3.5)	(9.8)	(6.8)		NON-CRYSTALLINE ROCK Moderate Weathering, Hard, Gray METAMUDSTONE with Close Fracture Spacing (GSI: 50-60)	10.7
485					100%	70%	98%	68%		Slight Weathering, Hard, Gray METAMUDSTONE with Close to Moderately Close Fractures (GSI: 60-70)	
	482.0	15.7	5.0	4:28/1.0 3:50/1.0 3:04/1.0 4:27/1.0 5:44/1.0	(4.8)	(3.3)					
480					96%	66%					
	477.0	20.7								Boring Terminated at Elevation 477.0 ft in Non-Crystalline Rock: METAMUDSTONE	20.7



# CORE PHOTOGRAPHS

**EB2-B**  
BOXES 1 & 2: 7.7- 20.7 FEET





## SITE PHOTOGRAPHS

Bridge No. 92 over Beaverdam Creek on SR 1903 (Gilboa Road)



Looking North from South Side of Bridge



Looking West from End Bent No. 2