

REFERENCE: SF-800590

PROJECT: 17BP.13.R.177

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

STRUCTURE  
SUBSURFACE INVESTIGATION

COUNTY RUTHERFORD  
PROJECT DESCRIPTION REPLACE BRIDGE # 0590 ON  
SR-1729 (CAMP McCALL RD) OVER SOMEY CREEK

CONTENTS

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-800590	1	11

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

-NCDOT-

DC CHEEK

CJ COFFEY

CD JOHNSON

DC ELLIOTT

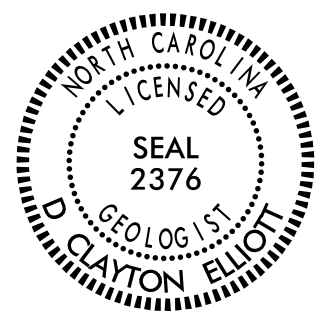
INVESTIGATED BY DC ELLIOTT

DRAWN BY DC ELLIOTT

CHECKED BY JC KUHNE

SUBMITTED BY JC KUHNE

DATE



DocuSigned by: D. Clayton Elliott 5/3/2019

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT 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 DISLOGGED 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.									
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>										<b>MINERALOGICAL COMPOSITION</b>										<b>WEATHERING</b>																			
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CPI) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																			
<b>CONSISTENCY OR DENSENESS</b>										<b>PERCENTAGE OF MATERIAL</b>										<b>GROUND WATER</b>										<b>MISCELLANEOUS SYMBOLS</b>									
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )										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										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION DIP & DIP DIRECTION OF ROCK STRUCTURES SOIL SYMBOL SPT DMT TEST BORING ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING INFERRED SOIL BOUNDARY CORE BORING INFERRED ROCK LINE MONITORING WELL ALLUVIAL SOIL BOUNDARY PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE									
<b>TEXTURE OR GRAIN SIZE</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>ROCK HARDNESS</b>																			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. MEDIUM HARD CAN BE GROOVED 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. SOFT CAN BE GROOVED 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. 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 FINGER NAIL.										UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK <b>ABBREVIATIONS</b> AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY NP - NON PLASTIC UG - UNIT WEIGHT CPT - CONE PENETRATION TEST ORG. - ORGANIC PMT - PRESSUREMETER TEST D - DRY UNIT WEIGHT CSE - COARSE DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY e - VOID RATIO FOSS. - FOSSILIFEROUS SO. - SAND, SANDY SL. - SILT, SILTY F - FINE FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL MO. - MOISTURE CONTENT HI. - HIGHLY FRAG. - FRAGMENTS HI. - HIGHLY V - VERY									
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>ABBREVIATIONS</b>										<b>FRACTURE SPACING</b>										<b>BEDDING</b>									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY NP - NON PLASTIC UG - UNIT WEIGHT CPT - CONE PENETRATION TEST ORG. - ORGANIC PMT - PRESSUREMETER TEST D - DRY UNIT WEIGHT CSE - COARSE DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY e - VOID RATIO FOSS. - FOSSILIFEROUS SO. - SAND, SANDY SL. - SILT, SILTY F - FINE FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL MO. - MOISTURE CONTENT HI. - HIGHLY FRAG. - FRAGMENTS HI. - HIGHLY V - VERY										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET									
<b>PLASTICITY</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>INDURATION</b>										<b>NOTES:</b>									
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH VERY LOW SLIGHTLY PLASTIC 0-5 VERY LOW SLIGHT MODERATELY PLASTIC 6-15 SLIGHT MEDIUM HIGHLY PLASTIC 16-25 MEDIUM HIGH 26 OR MORE HIGH										DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> CME-45C <input type="checkbox"/> CLAY BITS <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CME-550 <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> <input type="checkbox"/> CORE BIT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. 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. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										BENCH MARK: BL-4 : SURVEY DISK IN GROUND OFF SE CORNER OF EXISTING BRDG; @ -BL- STA 36+83.20 : N: 664630.63, E: 1166892.81 ELEVATION: 1147.61 FEET FIAD - FILLED IMMEDIATELY AFTER DRILLING **NOTE, FROM GEU: PROFILE FROM THE '17BP.13.R177_RDY_psh04' DGN PROFILE & RESCALED TO I: X: Y: CROSS-SECTIONS FROM THE 'B5877.is.tnl.tin' FILE APPLIED TO THE ABOVE dgn FILE									
<b>COLOR</b>																																							
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.																																							

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**SUBSURFACE INVESTIGATION**

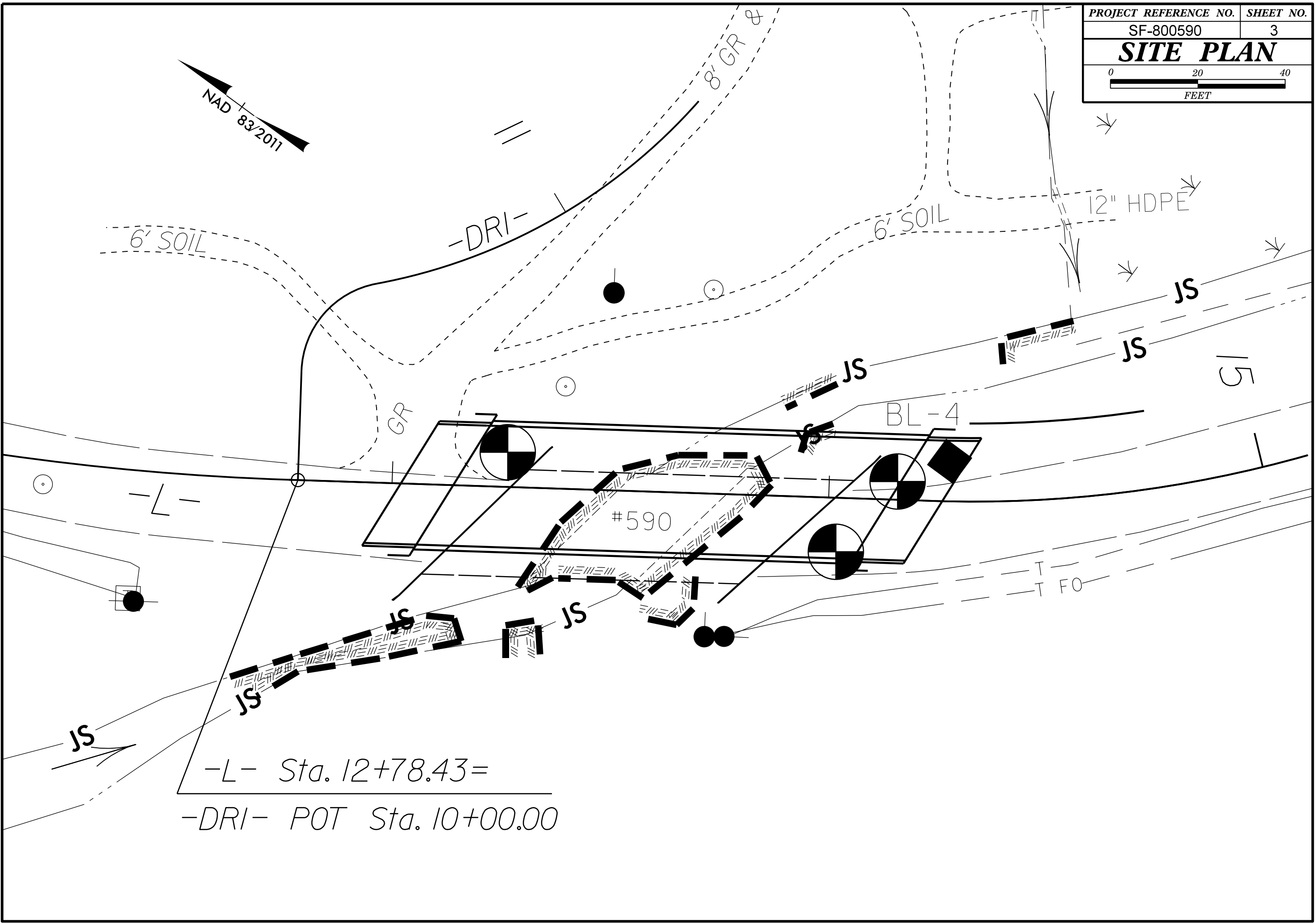
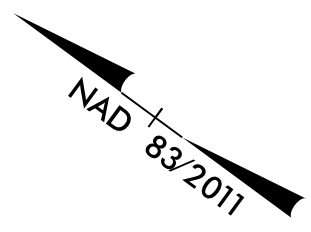
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

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

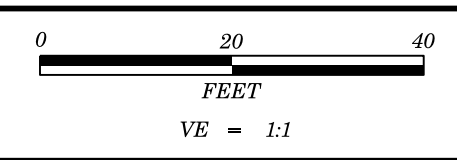
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

<p><b>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <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> <p><b>STRUCTURE</b></p>	<p><b>SURFACE CONDITIONS</b></p> <p>VERY GOOD Very rough, fresh unweathered surfaces</p> <p>GOOD Rough, slightly weathered, iron stained surfaces</p> <p>FAIR Smooth, moderately weathered and altered surfaces</p> <p>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</p> <p>DECREASING SURFACE QUALITY →</p>					<p><b>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</b></p> <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> <p><b>COMPOSITION AND STRUCTURE</b></p>	<p><b>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</b></p> <p>VERY GOOD - Very Rough, fresh unweathered surfaces</p> <p>GOOD - Rough, slightly weathered surfaces</p> <p>FAIR - Smooth, moderately weathered and altered surfaces</p> <p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p> <p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>				
<p><b>INTERLOCKING OF ROCK PIECES</b></p> <p>↓ DECREASING INTERLOCKING OF ROCK PIECES ↓</p> <p> INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p> BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p> VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p> BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p> DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p> LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	<p>90</p> <p>80</p> <p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p> <p>N/A</p> <p>N/A</p>					<p> <b>A. Thick bedded, very blocky sandstone</b> 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.</p> <p> <b>B. Sandstone with thin inter-layers of siltstone</b></p> <p> <b>C. Sandstone and siltstone in similar amounts</b></p> <p> <b>D. Siltstone or silty shale with sandstone layers</b></p> <p> <b>E. Weak siltstone or clayey shale with sandstone layers</b></p> <p><b>C, D, E, and G</b> - 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 <b>F</b> and <b>H</b>.</p> <p> <b>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</b></p> <p> <b>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</b></p> <p> <b>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.</b></p> <p>→ Means deformation after tectonic disturbance</p>	<p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>				

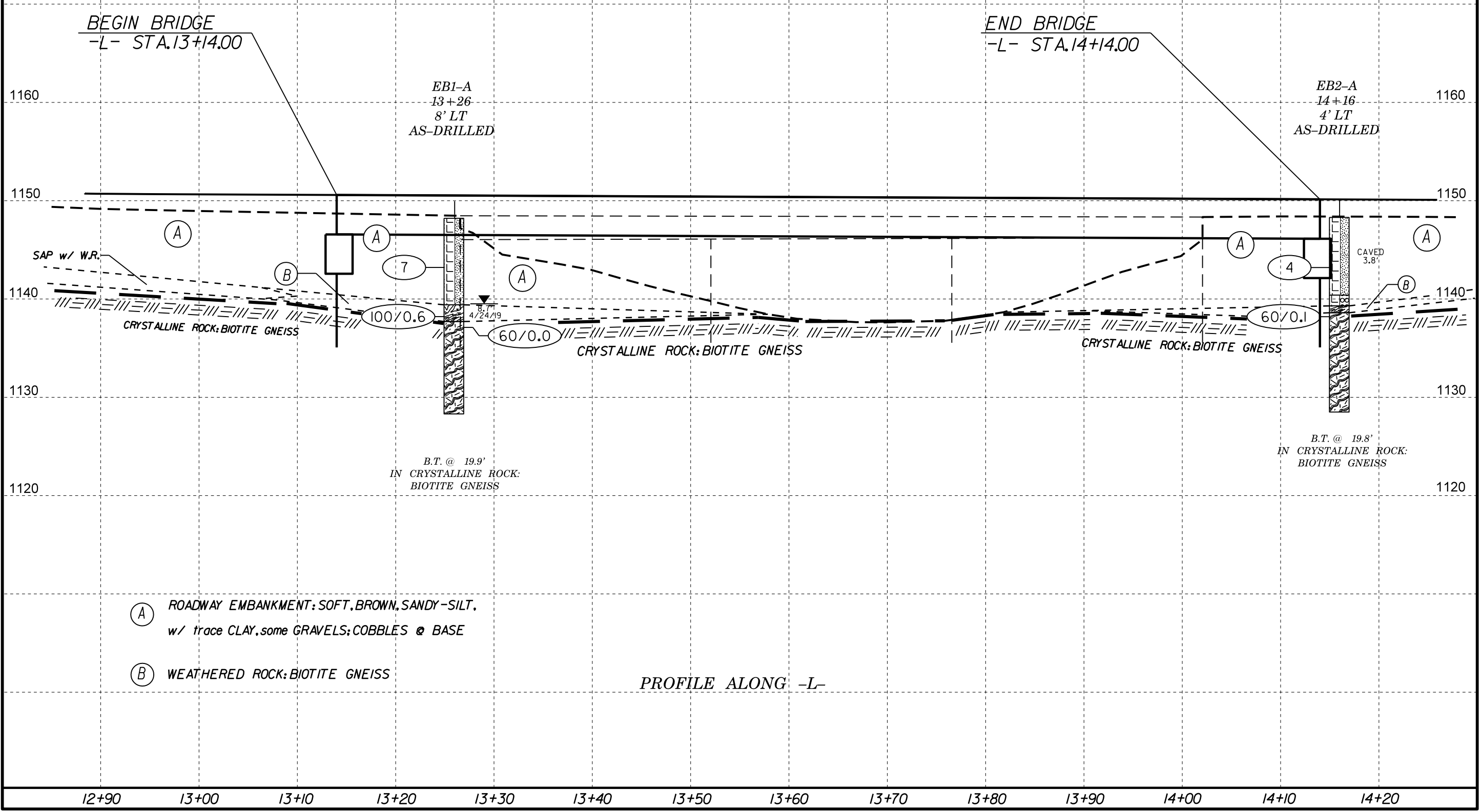
PROJECT REFERENCE NO.	SHEET NO.
SF-800590	3
<b>SITE PLAN</b>	
 0      20      40 FEET	

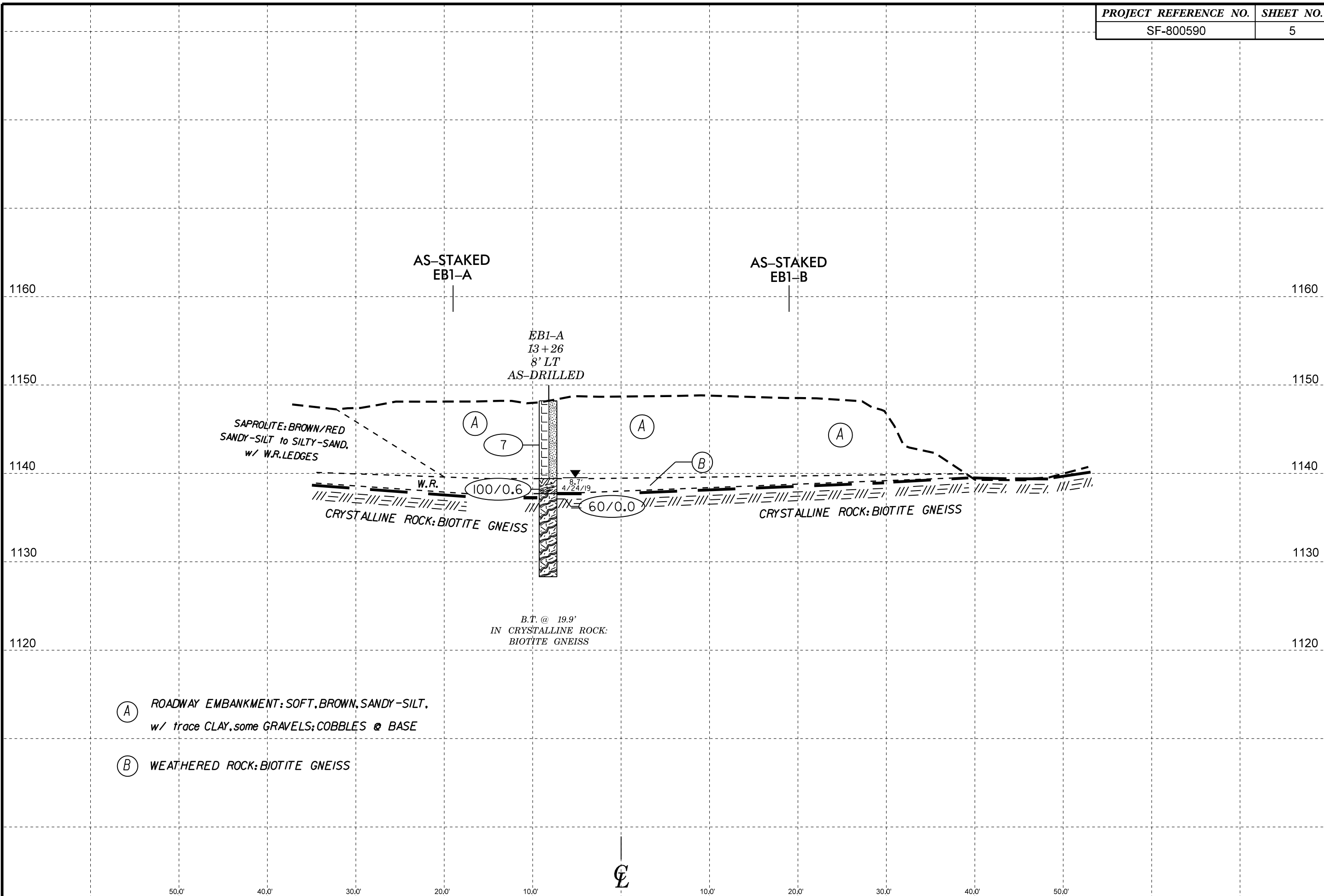


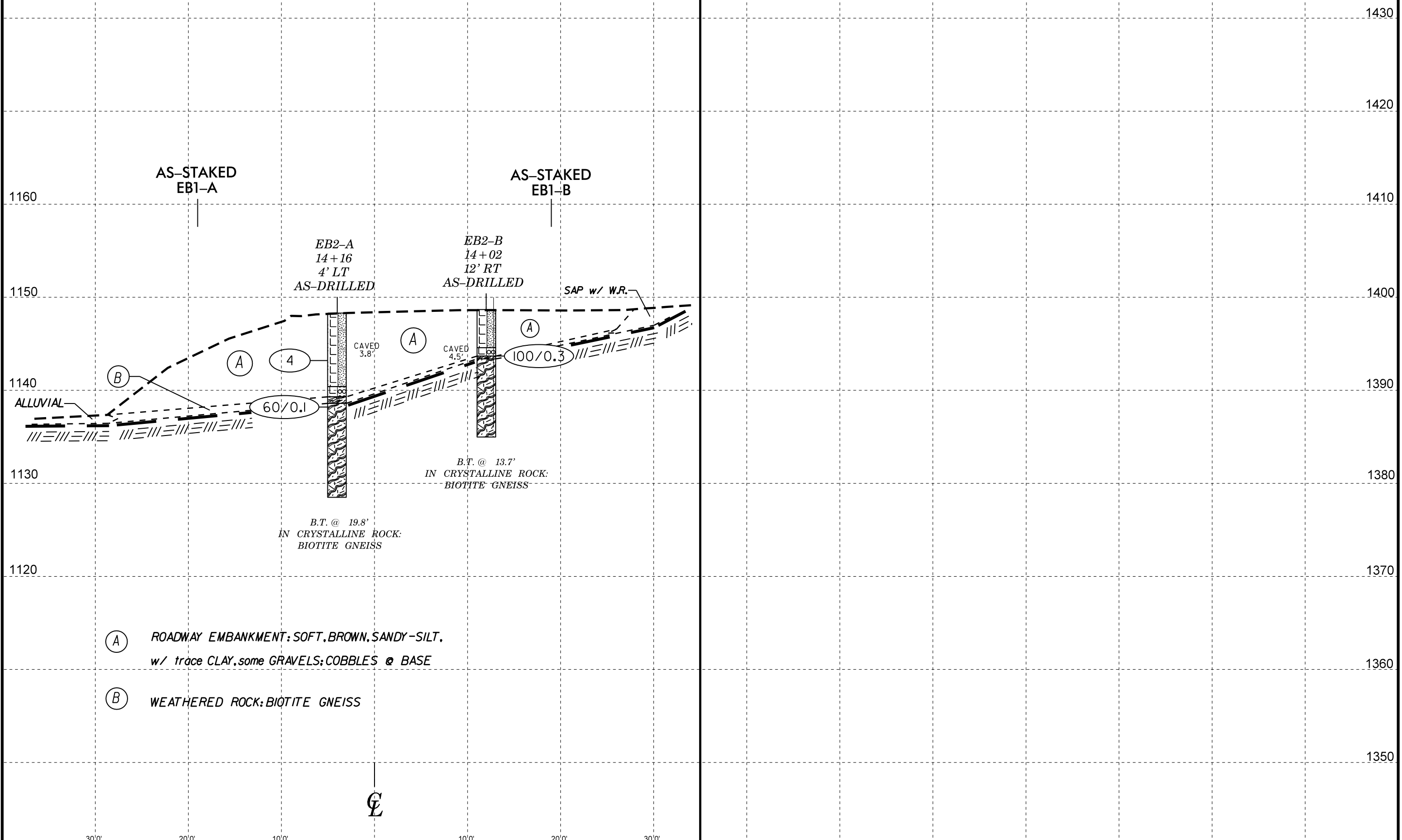
-L- Sta. 12+78.43=  
 -DRI- POT Sta. 10+00.00



PROJECT REFERENCE NO.	SHEET NO.
SF-800590	4
REPLACE BRIDGE #590 ON SR-1729 (CAMP McCALL RD) over SOMEY CREEK	







# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

<b>WBS</b> 17BP.13.R.177				<b>TIP</b> SF-800590				<b>COUNTY</b> RUTHERFORD				<b>GEOLOGIST</b> Johnson, C. D.			
<b>SITE DESCRIPTION</b> Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)										<b>GROUND WTR (ft)</b>					
<b>BORING NO.</b> EB1-A				<b>STATION</b> 13+26				<b>OFFSET</b> 8 ft LT				<b>ALIGNMENT</b> -L-			
<b>COLLAR ELEV.</b> 1,148.2 ft				<b>TOTAL DEPTH</b> 19.9 ft				<b>NORTHING</b> 664,713				<b>EASTING</b> 1,166,835			
<b>DRILL RIG/HAMMER EFF./DATE</b> AFO8963 CME-550X 77% 07/31/2017						<b>DRILL METHOD</b> NW Casing WSPT & Core				<b>HAMMER TYPE</b> Automatic					
<b>DRILLER</b> Cheek, D. O.				<b>START DATE</b> 04/23/19				<b>COMP. DATE</b> 04/23/19				<b>SURFACE WATER DEPTH</b> N/A			
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1150														1,148.2	0.0
1145															
	1,143.2	5.0													
			2	3	4										
1140															
	1,138.2	10.0													
	1,137.1	11.1	100/0.4												
1135			60/0.0												
1130															

<b>WBS</b> 17BP.13.R.177				<b>TIP</b> SF-800590				<b>COUNTY</b> RUTHERFORD				<b>GEOLOGIST</b> Johnson, C. D.			
<b>SITE DESCRIPTION</b> Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)										<b>GROUND WTR (ft)</b>					
<b>BORING NO.</b> EB1-A				<b>STATION</b> 13+26				<b>OFFSET</b> 8 ft LT				<b>ALIGNMENT</b> -L-			
<b>COLLAR ELEV.</b> 1,148.2 ft				<b>TOTAL DEPTH</b> 19.9 ft				<b>NORTHING</b> 664,713				<b>EASTING</b> 1,166,835			
<b>DRILL RIG/HAMMER EFF./DATE</b> AFO8963 CME-550X 77% 07/31/2017						<b>DRILL METHOD</b> NW Casing WSPT & Core				<b>HAMMER TYPE</b> Automatic					
<b>DRILLER</b> Cheek, D. O.				<b>START DATE</b> 04/23/19				<b>COMP. DATE</b> 04/23/19				<b>SURFACE WATER DEPTH</b> N/A			
CORE SIZE				TOTAL RUN				ELEV. (ft)				DESCRIPTION AND REMARKS	DEPTH (ft)		
NWXL	REC. (%)	ROD (%)	SAMP. NO.	REC. (%)	ROD (%)	LOG	ELEV. (ft)								
								1,137.1	11.1	3.8	N=60/0.0 1:30/0.8 1:35/1.0 1:32/1.0 1:45/1.0	(3.5) 92%	(2.7) 71%		
								1,133.3	14.9	5.0	1:32/1.0 1:35/1.0 1:35/1.0 1:47/1.0 1:45/1.0	(5.0) 100%	(5.0) 100%		
								1,128.3	19.9						
Boring Terminated at Elevation 1,128.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)															
GSI: 11.1' - 19.9' : 80-90															



# GEOTECHNICAL BORING REPORT

## BORE LOG

# GEOTECHNICAL BORING REPORT

## CORE LOG

WBS 17BP.13.R.177		TIP SF-800590		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.						
SITE DESCRIPTION Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)							GROUND WTR (ft)					
BORING NO. EB2-A		STATION 14+16		OFFSET 4 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 1,148.3 ft		TOTAL DEPTH 19.8 ft		NORTHING 664,639		EASTING 1,166,861						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic						
DRILLER Cheek, D. O.		START DATE 04/23/19		COMP. DATE 04/23/19		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			
1150												GROUND SURFACE 0.0
1145	1,143.2	5.1	1	2	2							ROADWAY EMBANKMENT RED/ORANGE SANDY-SILT, w/ trace of CLAY & MICA; some GRAVELS/COBBLES
1140	1,138.2	10.1										ROADWAY EMBANKMENT SANDY-SILT & GRAVELS w/ some BALLAST/COBBLES
1135												WEATHERED ROCK
1130												CRYSTALLINE ROCK BIOTITE GNEISS
												Boring Terminated at Elevation 1,128.5 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 17BP.13.R.177		TIP SF-800590		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.			
SITE DESCRIPTION Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)							GROUND WTR (ft)		
BORING NO. EB2-A		STATION 14+16		OFFSET 4 ft LT		ALIGNMENT -L-			
COLLAR ELEV. 1,148.3 ft		TOTAL DEPTH 19.8 ft		NORTHING 664,639		EASTING 1,166,861			
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic			
DRILLER Cheek, D. O.		START DATE 04/23/19		COMP. DATE 04/23/19		SURFACE WATER DEPTH N/A			
CORE SIZE		NWXL		TOTAL RUN 9.7 ft				LOG	DESCRIPTION AND REMARKS
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.		
1138.2	1,138.2	10.1	4.7	N=60/0.1 2:33/1.0 4:02/1.0 4:05/1.0 4:11/1.0 2:15/0.7	(3.6) 77%	(1.9) 40%		Begin Coring @ 10.1 ft CRYSTALLINE ROCK (continued)	
1135	1,133.5	14.8	5.0	1:59/1.0 2:06/1.0 2:21/1.0 2:07/1.0 2:03/1.0	100%	100%			
1130	1,128.5	19.8						Boring Terminated at Elevation 1,128.5 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	
								GSI: 10.1' - 12.2' : 50-60 12.2' - 19.8' : 85-95	

# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

WBS 17BP.13.R.177		TIP SF-800590		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.									
SITE DESCRIPTION Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 14+02		OFFSET 12 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,148.7 ft		TOTAL DEPTH 13.7 ft		NORTHING 664,638		EASTING 1,166,882									
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic									
DRILLER Cheek, D. O.		START DATE 04/23/19		COMP. DATE 04/23/19		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					
1150														GROUND SURFACE	0.0
														ASPHALT	0.3
1145	1,143.7	5.0												ROADWAY EMBANKMENT BROWN SANDY-SILT, w/ trace of CLAY & MICA, some GRAVELS	4.1
			100/0.3											ROADWAY EMBANKMENT SANDY-SILT & GRAVELS w/ some BALLAST/COBBLES	5.0
1140														WEATHERED ROCK	5.3
														CRYSTALLINE ROCK BIOTITE GNEISS	
1135															13.7
Boring Terminated at Elevation 1,135.0 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)															

NCDOT BORE DOUBLE 80\_GEO\_BRD0590\_MCDOWELL\_BOREHOLES.GPJ NC\_DOT.GDT 5/3/19

NCDOT BORE DOUBLE 80\_GEO\_BRD0590\_MCDOWELL\_BOREHOLES.GPJ NC\_DOT.GDT 5/3/19

WBS 17BP.13.R.177		TIP SF-800590		COUNTY RUTHERFORD		GEOLOGIST Johnson, C. D.						
SITE DESCRIPTION Replace Bridge No. 590 over Somey Creek on SR 1729 (Camp McCall Rd)							GROUND WTR (ft)					
BORING NO. EB2-B		STATION 14+02		OFFSET 12 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 1,148.7 ft		TOTAL DEPTH 13.7 ft		NORTHING 664,638		EASTING 1,166,882						
DRILL RIG/HAMMER EFF./DATE AFO8963 CME-550X 77% 07/31/2017				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Cheek, D. O.		START DATE 04/23/19		COMP. DATE 04/23/19		SURFACE WATER DEPTH N/A						
CORE SIZE			TOTAL RUN									
NWXL			8.4 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. (%)	RQD (%)		REC. (%)	RQD (%)			
1143.38	1,143.4	5.3	3.4	2:01/0.4 1:59/1.0 1:45/1.0 2:00/1.0	(3.4)	(0.9)					Continued from previous page	
1140	1,140.0	8.7	5.0	1:11/1.0 1:32/1.0 2:25/1.0 1:39/1.0 1:50/1.0	100%	26%					CRYSTALLINE ROCK	5.3
1135	1,135.0	13.7									Boring Terminated at Elevation 1,135.0 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS)	13.7
GSI: 5.3' - 10.8' : 45-55 10.8' - 13.7' : 85-95												

# CORE PHOTOGRAPHS

## EB1-A

BOX 1 of 1 : 11.1 - 19.9 FEET



GEOLOGICAL STRENGTH INDEX: GSI  
11.1' - 19.9' : 80-90

## EB2-A

BOX 1 of 1 : 10.1 - 19.8 FEET



GEOLOGICAL STRENGTH INDEX: GSI  
10.1' - 12.2' : 50-60  
12.2' - 19.8' : 85-95

## CORE PHOTOGRAPHS

### EB2-B

BOX 1 of 1 : 5.0 - 13.7 FEET



GEOLOGICAL STRENGTH INDEX: GSI

5.3' - 10.8' : 45-55

10.8' - 13.7' : 85-95