

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

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for General Class, Granular Materials (A-1 to A-7), Silty-Clay Materials (A-1 to A-7), Organic Materials (A-1, A-2, A-3, A-4, A-5, A-6, A-7), and Soil Symbols. Includes rows for % Passing, Material Passing #10, #40, #200, Group Index, and Usual Types of Major Materials.

PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

Table mapping Primary Soil Type (e.g., Generally Granular Material, Generally Silty-Clay Material) to Consistency (e.g., Very Loose, Medium Dense, Very Dense) and Range of Unconfined Compressive Strength (TONS/FT²).

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size (mm and inches) and corresponding grain size ranges for Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating Soil Moisture Scale (Atterberg Limits), Field Moisture Description (e.g., Saturated, Wet, Moist, Dry), and Guide for Field Moisture Description (e.g., Usually Liquid, Semisolid, Solid).

PLASTICITY

Table showing Plasticity Index (PI) ranges (Non-plastic, Slightly plastic, Moderately plastic, Highly plastic) and corresponding Dry Strength (Very low, Slight, Medium, High).

COLOR

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

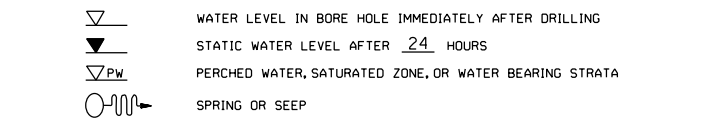
COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE (LL < 31), MODERATELY COMPRESSIBLE (LL = 31 - 50), HIGHLY COMPRESSIBLE (LL > 50)

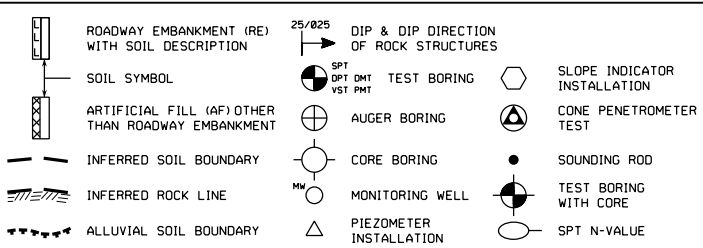
PERCENTAGE OF MATERIAL

Table showing percentages for Organic Material, Granular Soils, Silty-Clay Soils, and Other Material (Trace, Little, Moderately, Highly organic).

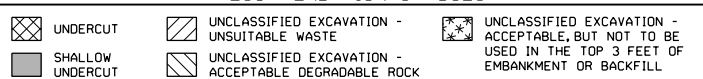
GROUND WATER



MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table of abbreviations for soil and rock types, tests, and equipment. Includes categories like AR - Auger Refusal, MED. - Medium, VST - Vane Shear Test, etc.

EQUIPMENT USED ON SUBJECT PROJECT

Form for recording equipment used, including sections for Drill Units (CME-45C, CME-55, CME-550, Vane Shear Test, Portable Hoist), Advancing Tools (Clay Bits, Augers, Bits, Inserts, Casing, Tricone bits, Core bit), Hammer Type (Automatic, Manual), Core Size (B, H, N), and Hand Tools (Post hole digger, Auger, Sounding rod, Vane shear test).

ROCK DESCRIPTION

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:

Table describing rock types: Weathered Rock (WR), Crystalline Rock (CR), Non-Crystalline Rock (NCR), and Coastal Plain Sedimentary Rock (CP). Includes descriptions of grain sizes and typical materials.

WEATHERING

Table describing weathering degrees: Fresh, Very Slight (IV SLI), Slight (SLI), Moderate (MOD), Moderately Severe (MOD. SEV.), Severe (SEV.), Very Severe (V SEV.), and Complete. Includes descriptions of rock appearance and strength.

ROCK HARDNESS

Table describing rock hardness levels: Very Hard, Hard, Moderately Hard, Medium Hard, Soft, and Very Soft. Includes descriptions of how the rock can be scratched or broken.

FRACTURE SPACING

Table showing fracture spacing terms (Very wide, Wide, Moderately close, Close, Very close) and corresponding spacing ranges (e.g., More than 10 feet, 3 to 10 feet).

BEDDING

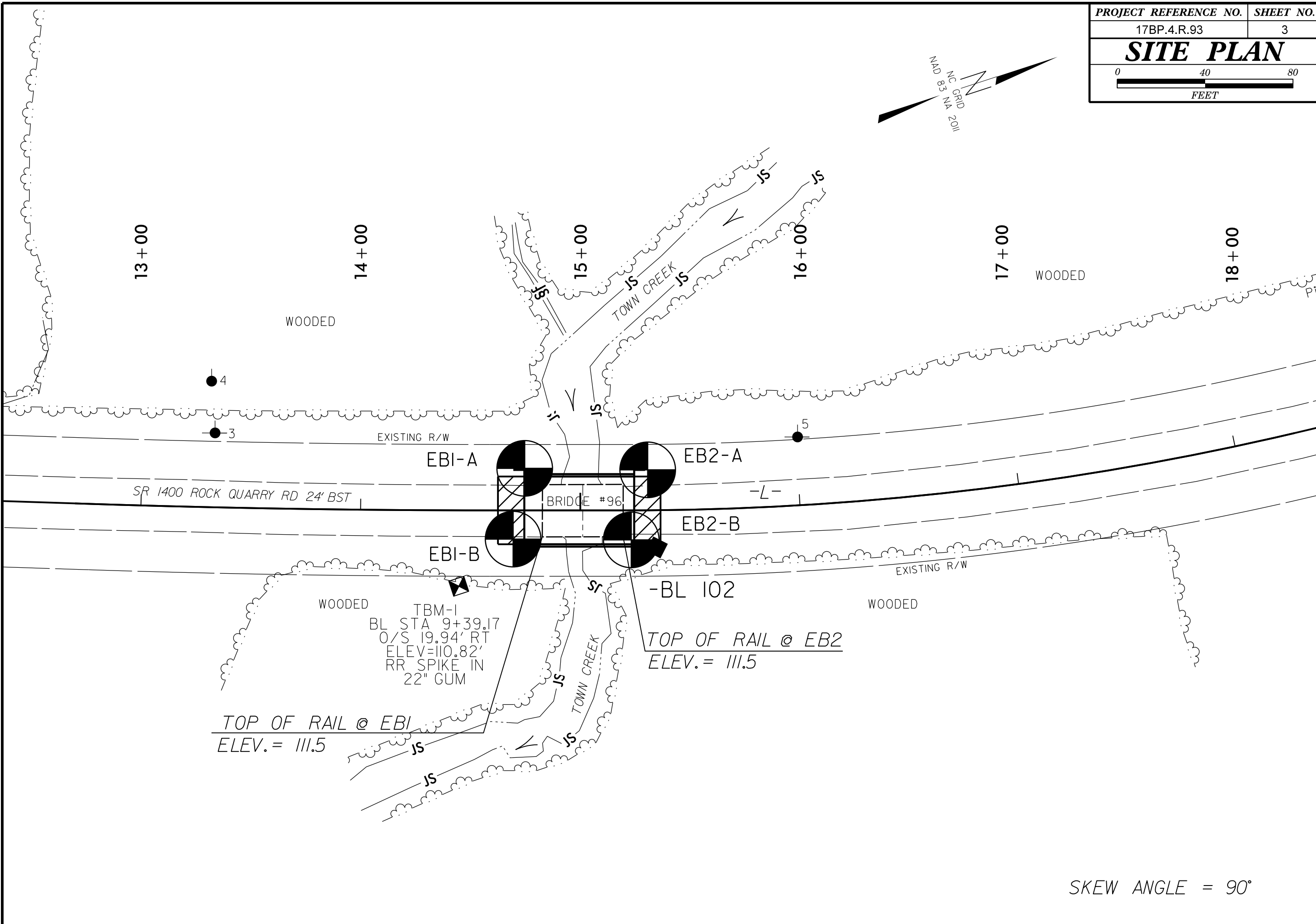
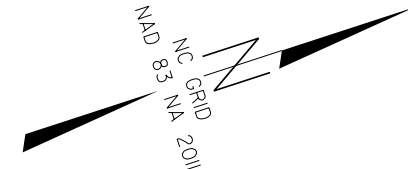
Table showing bedding terms (Very thickly bedded, Thickly bedded, Thinly bedded, Very thinly bedded, Thickly laminated, Thinly laminated) and corresponding thicknesses (e.g., 4 feet, 1.5 - 4 feet).

TERMS AND DEFINITIONS

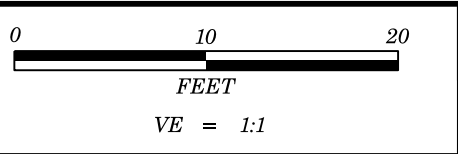
Table of definitions for geotechnical terms: Alluvium, Aquifer, Arenaceous, Argillaceous, Artesian, Calcareous, Colluvium, Core Recovery, Dike, Dip, Dip Direction, Fault, Fissile, Float, Flood Plain, Formation, Joint, Ledger, Lens, Mottled, Saprolite, Sill, Slickenside, Standard Penetration Test, Strata, Strata Rock Quality Designation, Topsoil, Bench Mark, Elevation.

NOTES:

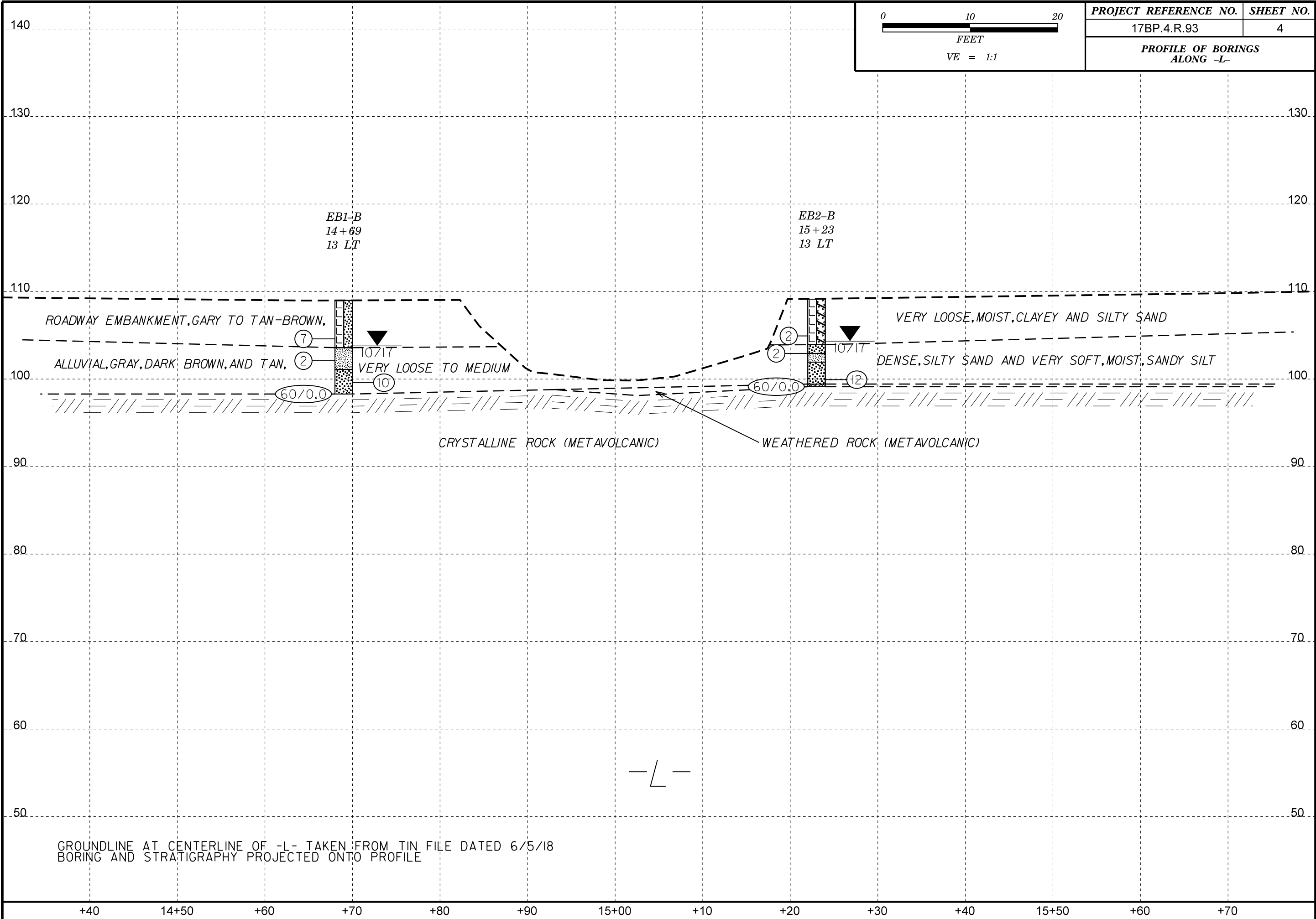
TOP OF RAIL AT EB1 STA. 14+85, 11'RT ELEV.= 111.5
TOP OF RAIL AT EB2 STA. 15+17, 11'RT ELEV.= 111.5



SKEW ANGLE = 90°

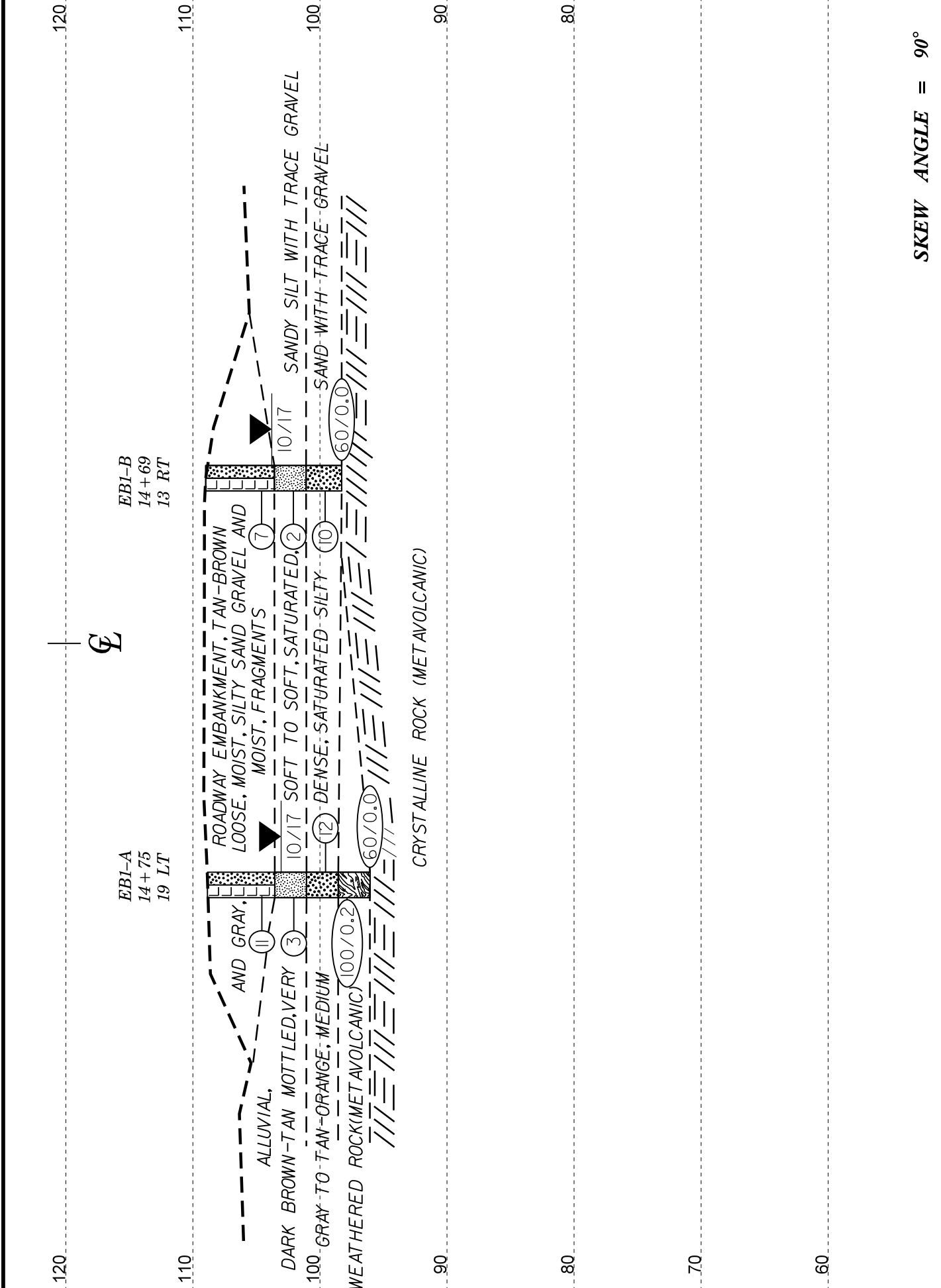


| PROJECT REFERENCE NO. | SHEET NO. |
|---------------------------------|-----------|
| 17BP.4.R.93 | 4 |
| PROFILE OF BORINGS ALONG -L- | |

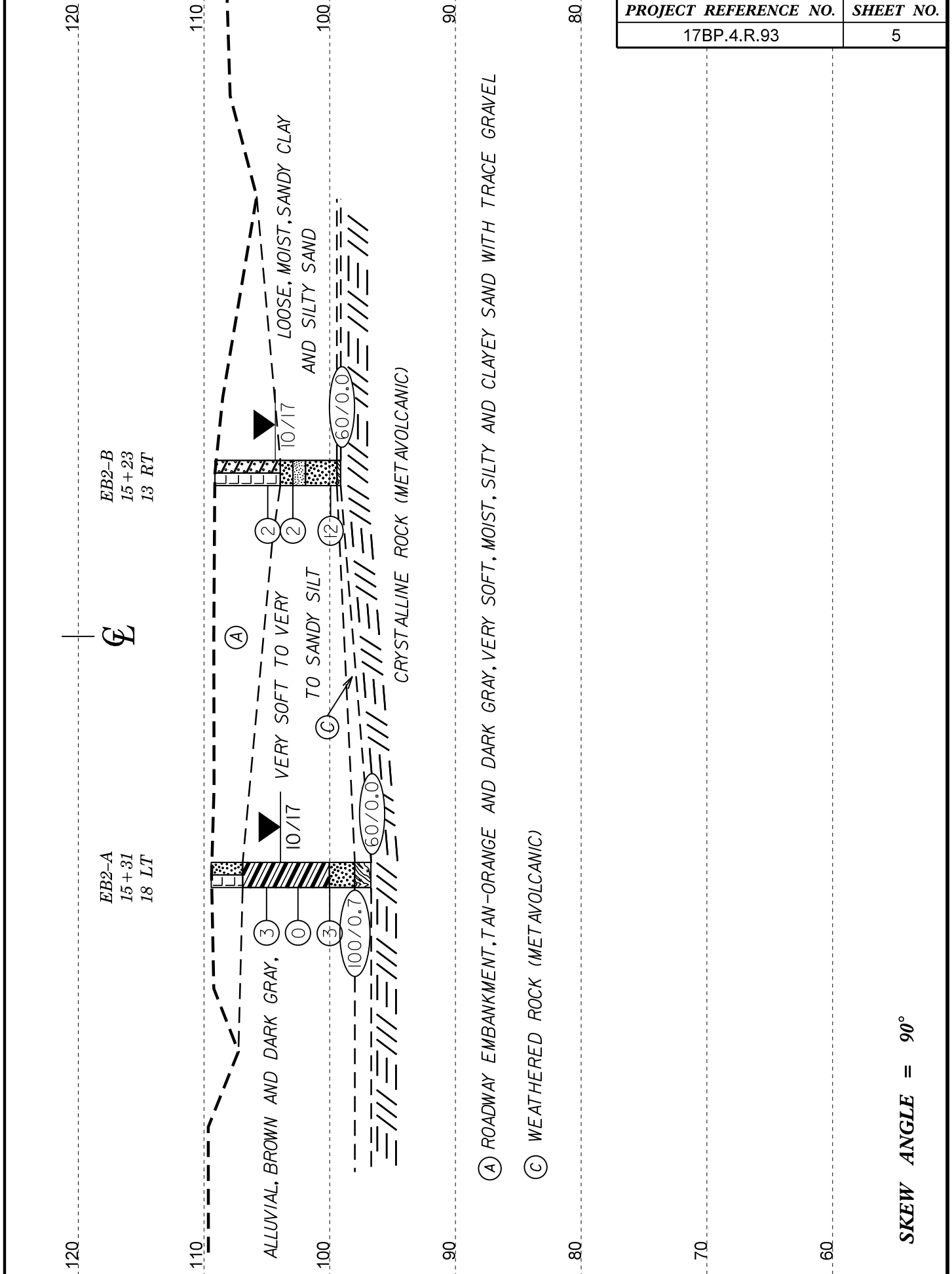


GROUNDLINE AT CENTERLINE OF -L- TAKEN FROM TIN FILE DATED 6/5/18
BORING AND STRATIGRAPHY PROJECTED ONTO PROFILE

-L-



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 **CROSS SECTION THROUGH EBI**



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 **CROSS SECTION THROUGH EB2**

SKEW ANGLE = 90°

SKEW ANGLE = 90°

- (A) ROADWAY EMBANKMENT, TAN-ORANGE AND DARK GRAY, VERY SOFT, MOIST, SILTY AND CLAYEY SAND WITH TRACE GRAVEL
- (C) WEATHERED ROCK (METAVOLCANIC)

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 17BP.4.R.93 | | TIP 970096 | | COUNTY WILSON | | GEOLOGIST Kintner, A. N. | | | | | | | | | | |
|--|-----------------|--------------------------|------------|-----------------------|-------|--------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|------|
| SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR1400) OVER TOWN CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A | | STATION 14+75 | | OFFSET 19 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 108.9 ft | | TOTAL DEPTH 12.8 ft | | NORTHING 761,850 | | EASTING 2,344,722 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER Pinter, D. G. | | START DATE 10/11/17 | | COMP. DATE 10/11/17 | | 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 | | | | | | |
| 110 | | | | | | | | | | | | | | 108.9 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | 107.4 | ROADWAY EMBANKMENT BROWN, SILTY SAND | 1.5 |
| 105 | 105.6 | 3.3 | 4 | 5 | 6 | | | | | | | | | 103.6 | BROWN-TAN, SILTY SAND WITH SUBANGULAR TO SUBROUNDED GRAVEL | 5.3 |
| | 103.1 | 5.8 | 2 | 0 | 3 | | | | | | | | | 101.1 | ALLUVIAL TAN-BROWN, MOTTLED, SANDY SILT | 7.8 |
| 100 | 100.6 | 8.3 | 27 | 8 | 4 | | | | | | | | | 98.6 | GRAY-TAN, SILTY SAND WITH ANGULAR GRAVEL | 10.3 |
| | 98.1 | 10.8 | 100/0.2 | | | | | | | | | | | 96.1 | WEATHERED ROCK (METAVOLCANIC) | 12.8 |
| | 96.1 | 12.8 | 60/0.0 | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 96.1 ft ON CRYSTALLINE ROCK (METAVOLCANIC) | |

| WBS 17BP.4.R.93 | | TIP 970096 | | COUNTY WILSON | | GEOLOGIST Kintner, A. N. | | | | | | | | | | |
|--|-----------------|--------------------------|------------|-----------------------|-------|--------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR1400) OVER TOWN CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B | | STATION 14+69 | | OFFSET 13 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 109.0 ft | | TOTAL DEPTH 10.7 ft | | NORTHING 761,835 | | EASTING 2,344,751 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | | |
| DRILLER Pinter, D. G. | | START DATE 10/12/17 | | COMP. DATE 10/12/17 | | 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 | | | | | | |
| 110 | | | | | | | | | | | | | | 109.0 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | 103.6 | ROADWAY EMBANKMENT GRAY-TAN-BROWN, SILTY SAND WITH TRACE SUBANGULAR TO ANGULAR GRAVEL AND WOOD FRAGMENTS | 5.4 |
| 105 | 105.6 | 3.4 | 5 | 4 | 3 | | | | | | | | | 101.1 | ALLUVIAL DARK BROWN-TAN, SANDY SILT WITH TRACE SUBANGULAR GRAVEL | 7.9 |
| | 103.1 | 5.9 | 2 | 1 | 1 | | | | | | | | | 98.3 | GRAY TO TAN-ORANGE, SILTY SAND WITH TRACE SUBROUNDED GRAVEL | 10.7 |
| 100 | 100.6 | 8.4 | 4 | 6 | 4 | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 98.3 ft ON CRYSTALLINE ROCK (METAVOLCANIC) | |
| | 98.3 | 10.7 | 60/0.0 | | | | | | | | | | | | | |

NCDOT BORE DOUBLE 980096_GEO_BH_BRDG0096.GPJ NC_DOT.GDT 6/12/18

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 17BP.4.R.93 | | TIP 970096 | | COUNTY WILSON | | GEOLOGIST Kintner, A. N. | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|--------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR1400) OVER TOWN CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A | | STATION 15+31 | | OFFSET 18 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 109.4 ft | | TOTAL DEPTH 12.7 ft | | NORTHING 761,903 | | EASTING 2,344,740 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER Pinter, D. G. | | START DATE 10/11/17 | | COMP. DATE 10/11/17 | | 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 | | | | | | |
| 110 | | | | | | | | | | | | | | 109.4 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | 106.9 | ROADWAY EMBANKMENT TAN-ORANGE, SILTY SAND | 2.5 |
| 105 | 106.0 | 3.4 | 2 | 1 | 2 | | | | | | | | | 106.9 | ALLUVIAL DARK GRAY-BROWN, SANDY CLAY | |
| | 103.5 | 5.9 | WOH | WOH | WOH | | | | | | | | | | | |
| 100 | 101.0 | 8.4 | 2 | 1 | 2 | | | | | | | | | 100.0 | DARK GRAY, SILTY SAND WITH SUBROUNDED GRAVEL | 9.4 |
| | 98.5 | 10.9 | 3 | 97/0.2 | | | | | | | | | | 98.0 | WEATHERED ROCK (METAVOLCANIC) | 11.4 |
| | 96.7 | 12.7 | | | | | | | | | | | | 96.7 | WEATHERED ROCK (METAVOLCANIC) | 12.7 |
| | | | | | | | | | | | | | | | | |

| WBS 17BP.4.R.93 | | TIP 970096 | | COUNTY WILSON | | GEOLOGIST Kintner, A. N. | | | | | | | | | | |
|--|-----------------|---------------------|--------------------------|---------------------|-----------------------|--------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|---|------|
| SITE DESCRIPTION BRIDGE NO. 96 ON -L- (SR1400) OVER TOWN CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-B | | STATION 15+23 | | OFFSET 13 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 109.1 ft | | TOTAL DEPTH 10.0 ft | | NORTHING 761,886 | | EASTING 2,344,768 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 90% 07/12/2016 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER Pinter, D. G. | | START DATE 10/12/17 | | COMP. DATE 10/12/17 | | 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 | | | | | | |
| 110 | | | | | | | | | | | | | | 109.1 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | | | |
| 105 | 105.9 | 3.2 | 3 | 2 | 0 | | | | | | | | | 103.9 | ROADWAY EMBANKMENT DARK GRAY-TAN, CLAYEY SAND WITH RIP RAP GRAVEL | 5.2 |
| | 103.4 | 5.7 | 1 | 1 | 1 | | | | | | | | | 102.9 | ALLUVIAL GRAY, SILTY SAND | 6.2 |
| | 100.9 | 8.2 | 3 | 6 | 6 | | | | | | | | | 101.9 | DARK GRAY, SANDY SILT | 7.2 |
| | 99.1 | 10.0 | | | | | | | | | | | | 99.4 | GRAY-ORANGE-TAN, SILTY SAND WITH SUBROUNDED GRAVEL | 9.7 |
| | | | | | | | | | | | | | | 99.1 | WEATHERED ROCK (METAVOLCANIC) | 10.0 |
| | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE 980096_GEO_BH_BRDG0096.GPJ NC_DOT.GDT 6/12/18

PROJ. NO. - 17BP.4.R.93
ID NO. - 970096
COUNTY - WILSON

EB1-A

| SOIL TEST RESULTS | | | | | | | | | | | | | | | |
|--------------------------|--------|---------|----------------|---------------|------|------|-------------|--------|------|------|--------------------|----|-----|------------|-----------|
| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
| | | | | | | | C.SAND | F.SAND | SILT | CLAY | 10 | 40 | 200 | | |
| SS-1 | 19' LT | 14+75 | 5.8-7.3 | A-4(0) | 22 | 6 | 30.9 | 38.2 | 12.7 | 18.2 | 100 | 84 | 37 | - | - |
| SS-2 | 19' LT | 14+75 | 8.3-10.2 | A-2-4(0) | 27 | 7 | 50.1 | 26.7 | 9.1 | 14.1 | 63 | 40 | 17 | - | - |

EB2-A

| SOIL TEST RESULTS | | | | | | | | | | | | | | | |
|--------------------------|--------|---------|----------------|---------------|------|------|-------------|--------|------|------|--------------------|----|-----|------------|-----------|
| SAMPLE NO. | OFFSET | STATION | DEPTH INTERVAL | AASHTO CLASS. | L.L. | P.I. | % BY WEIGHT | | | | % PASSING (SIEVES) | | | % MOISTURE | % ORGANIC |
| | | | | | | | C.SAND | F.SAND | SILT | CLAY | 10 | 40 | 200 | | |
| SS-3 | 18' LT | 15+31 | 3.4-4.9 | A-6(1) | 32 | 16 | 38.8 | 22.8 | 14.1 | 24.2 | 84 | 59 | 36 | - | - |