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REFERENCE: B-2506

PROJECT: 32638

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ANSON
PROJECT DESCRIPTION REPLACE BRIDGE 8 ON
SR 1627 OVER BROWN CREEK

CONTENTS

| <u>SHEET NO.</u> | <u>DESCRIPTION</u> |
|------------------|--------------------|
| 1 | TITLE SHEET |
| 2 | LEGEND |
| 3 | SITE PLAN |
| 4 | PROFILES |
| 5 | CROSS SECTIONS |
| 6-8 | BORE LOGS |
| 9 | SOIL TEST RESULTS |
| 10 | SITE PHOTOGRAPHS |

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | B-2506 | 1 | 10 |

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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. WALKO, P.E.

J. BRADSHAW, E.I.

A. ROTH

AMERIDRILL

INVESTIGATED BY ECS CAROLINAS, LLP

DRAWN BY D. ABBOTT

CHECKED BY E. FREEBURG, P.E.

SUBMITTED BY M. WALKO, P.E.

DATE AUGUST, 2015

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED



DocuSigned by:
Michael J. Walko

54F1F8F352D2406... 9/15/2015

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

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, 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), and Organic Materials (A-1, A-2, A-3, A-4, A-5, A-6, A-7). Includes symbols for soil types and consistency/denseness indicators.

CONSISTENCY OR DENSENESS

Table mapping soil types (e.g., Generally Granular, Generally Silty-Clay) to consistency/denseness levels (e.g., Very Loose, Very Dense) and unconfined compressive strength ranges.

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size (mm and in) 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) with Field Moisture Description (e.g., Saturated, Wet, Moist, Dry) and Guide for Field Moisture Description.

PLASTICITY

Table showing Plasticity Index (PI) ranges and corresponding Dry Strength levels (Very Low, Slight, Medium, High).

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). 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.

GROUND WATER

Water level symbols: 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.

MISCELLANEOUS SYMBOLS

Diagrammatic symbols for Roadway Embankment, Soil Symbol, Artificial Fill, Inferred Soil Boundary, Inferred Rock Line, Alluvial Soil Boundary, Dip and Dip Direction, Test Boring, Auger Boring, Core Boring, Monitoring Well, Piezometer Installation, Slope Indicator, Cone Penetrometer Test, Sounding Rod, Test Boring with Core, SPT N-value.

RECOMMENDATION SYMBOLS

Symbols for Undercut Excavation, Shallow Undercut, Unclassified Excavation - Unsuitable Waste, Unclassified Excavation - Acceptable Degradable Rock, Unclassified Excavation - Acceptable, but not to be used in the top 3 feet of embankment or backfill.

ABBREVIATIONS

Table of abbreviations for various tests and materials: AR - Auger Refusal, BT - Boring Terminated, CL - Clay, CPT - Cone Penetration Test, CSE - Coarse, DMT - Dilatometer Test, DPT - Dynamic Penetration Test, e - Void Ratio, F - Fine, FOSS - Fossiliferous, FRAC - Fractured, Fragments, HI - Highly, MED - Medium, MICA - Micaceous, MOD - Moderately, NP - Non Plastic, ORG - Organic, PMT - Pressuremeter Test, SAP - Saprolitic, SD - Sand, Sandy, SL - Silty, Silty, SLI - Slightly, TCR - Tricone Refusal, w - Moisture Content, V - Very, VST - Vane Shear Test, WEA - Weathered, U - Unit Weight, D - Dry Unit Weight, SAMPLE ABBREVIATIONS: S - Bulk, SS - Split Spoon, ST - Shelby Tube, RS - Rock, RT - Re-compacted Triaxial, CBR - California Bearing Ratio.

EQUIPMENT USED ON SUBJECT PROJECT

Checklist of equipment used: Drill Units (CME-45C, CME-55, CME-550, Vane Shear Test, Portable Hoist), Advancing Tools (Clay Bits, 6" Continuous Flight Auger, 8" Hollow Augers, Hard Faced Finger Bits, Tung-Carbide Inserts, Casing w/ Advancer, Tricone 2 1/16" Steel Teeth, Tricone Tung-Carb., Core Bit), Hammer Type (Automatic, Manual), Core Size (-B, -H, -N), Hand Tools (Post Hole Digger, Hand 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:

WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.

NON-CRYSTALLINE ROCK (NCR) 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 (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL.
SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF.
VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF.
COMPLETE: ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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 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.
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.
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.

FRACTURE SPACING

Table mapping Fracture Spacing (Term) to Bedding (Term) and Thickness. Fracture 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). Bedding: 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).

INDURATION

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.

TERMS AND DEFINITIONS

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.

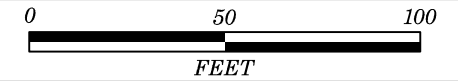
BENCH MARK: BM#1 - Nail in 30" Oak at -BL-8+32, 28'LT

ELEVATION: 200.86 FEET

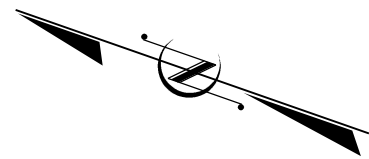
NOTES:

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SITE PLAN

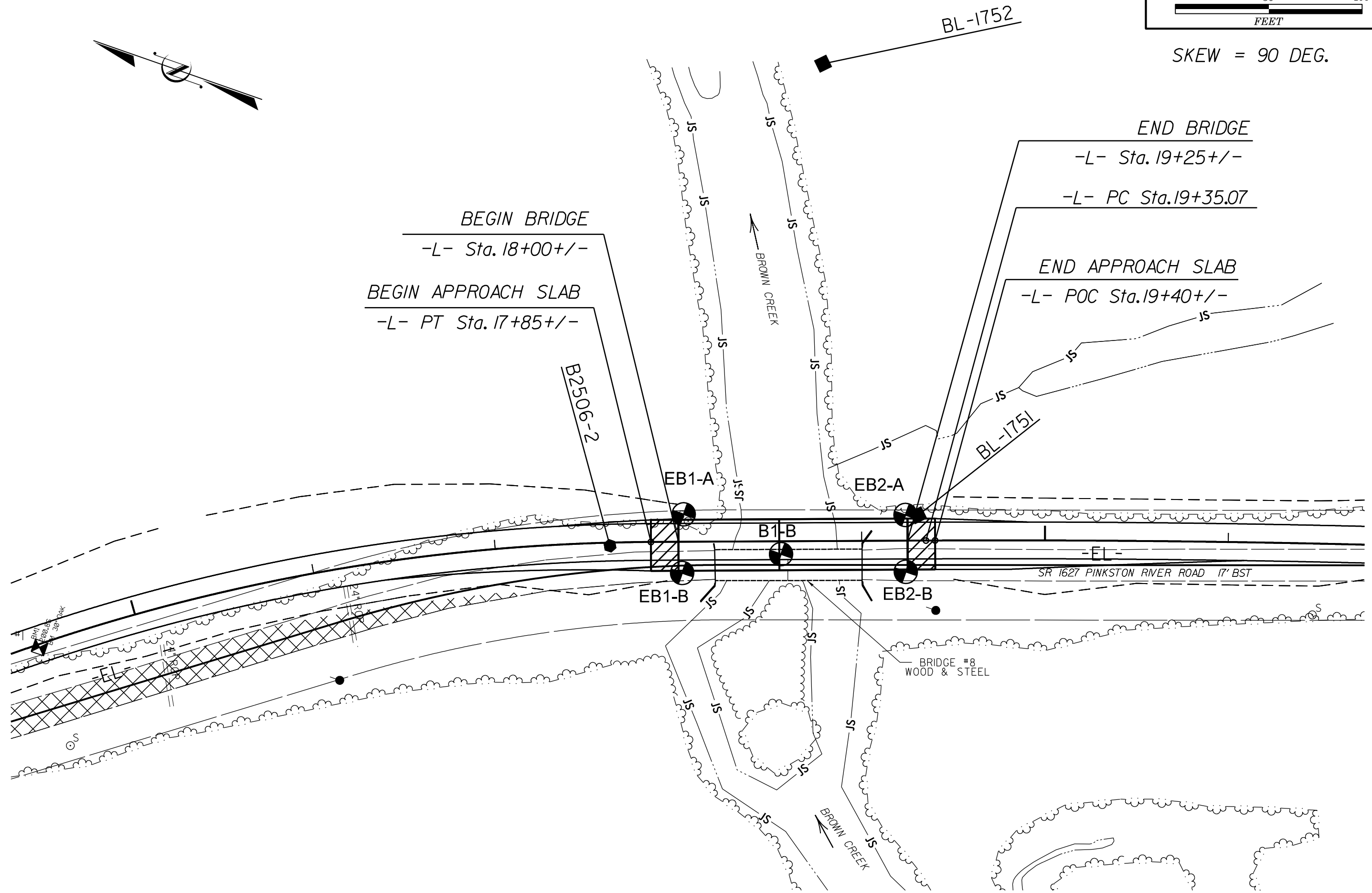


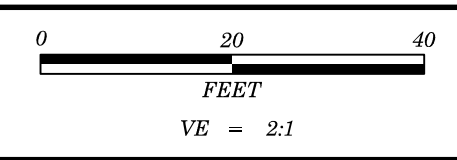
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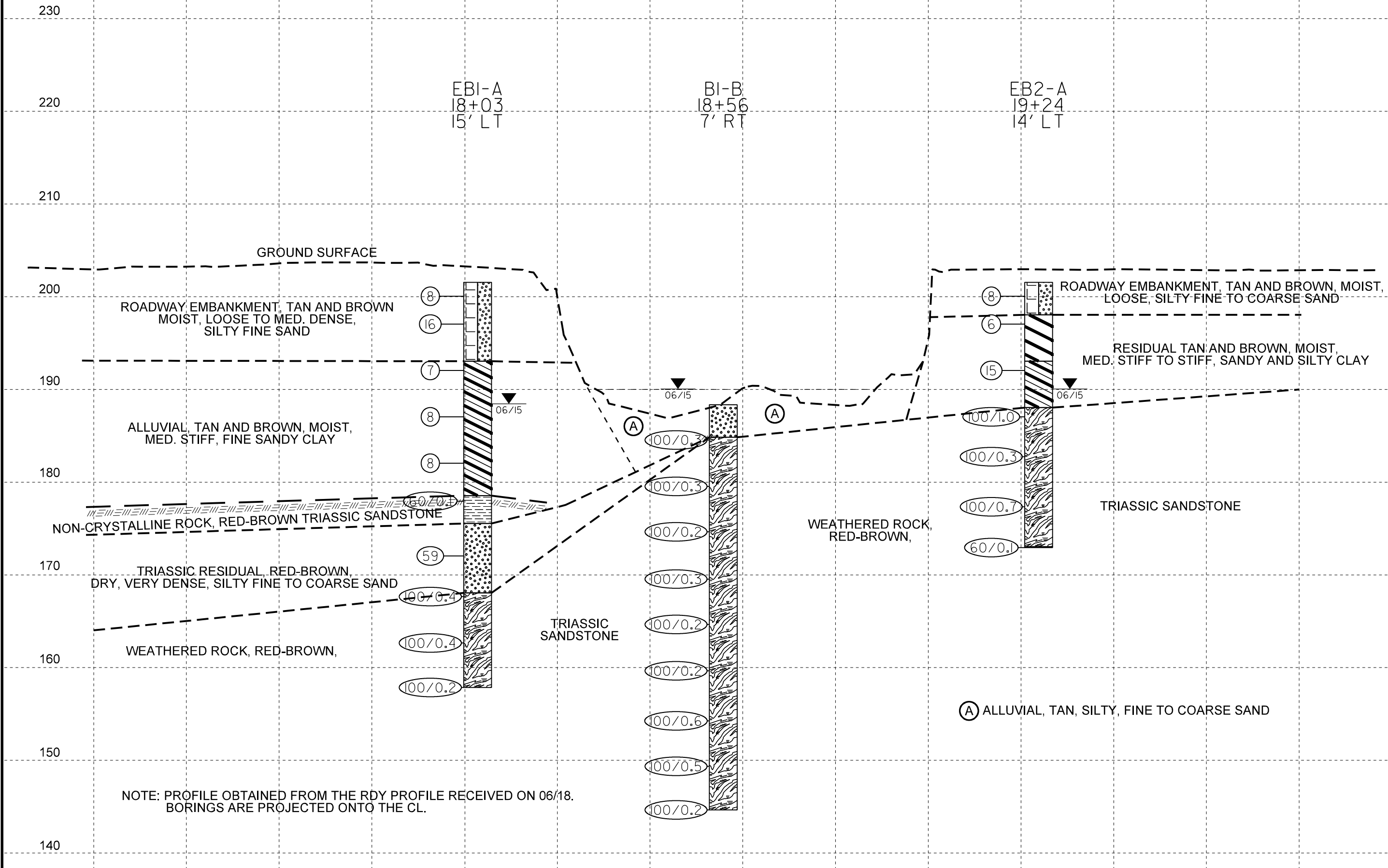
BEGIN BRIDGE
-L- Sta. 18+00+/-
BEGIN APPROACH SLAB
-L- PT Sta. 17+85+/-

END BRIDGE
-L- Sta. 19+25+/-
-L- PC Sta. 19+35.07
END APPROACH SLAB
-L- POC Sta. 19+40+/-





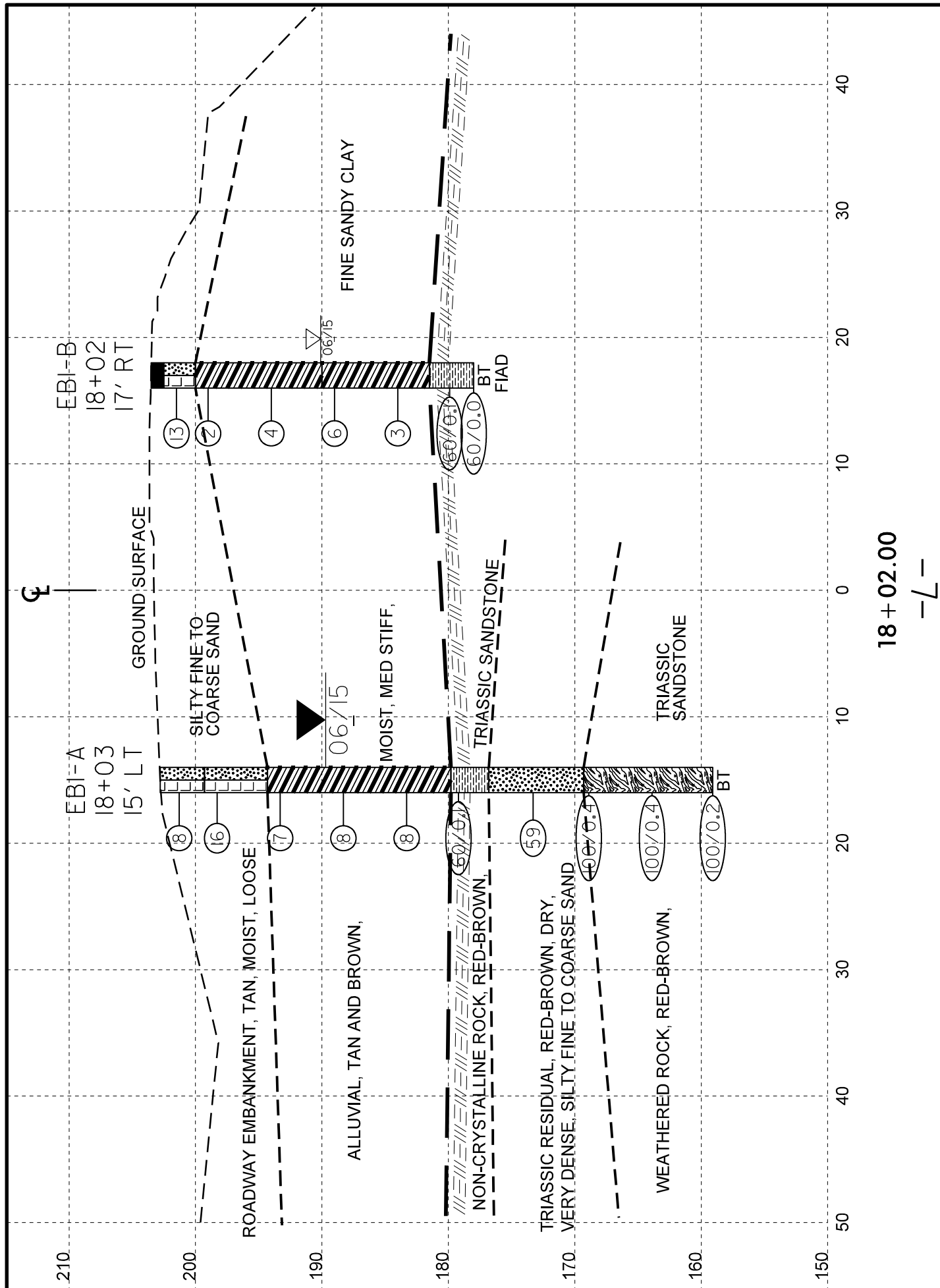
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| PROFILE ALONG CENTERLINE OF -L- | |



NOTE: PROFILE OBTAINED FROM THE RDY PROFILE RECEIVED ON 06/18. BORINGS ARE PROJECTED ONTO THE CL.

(A) ALLUVIAL, TAN, SILTY, FINE TO COARSE SAND

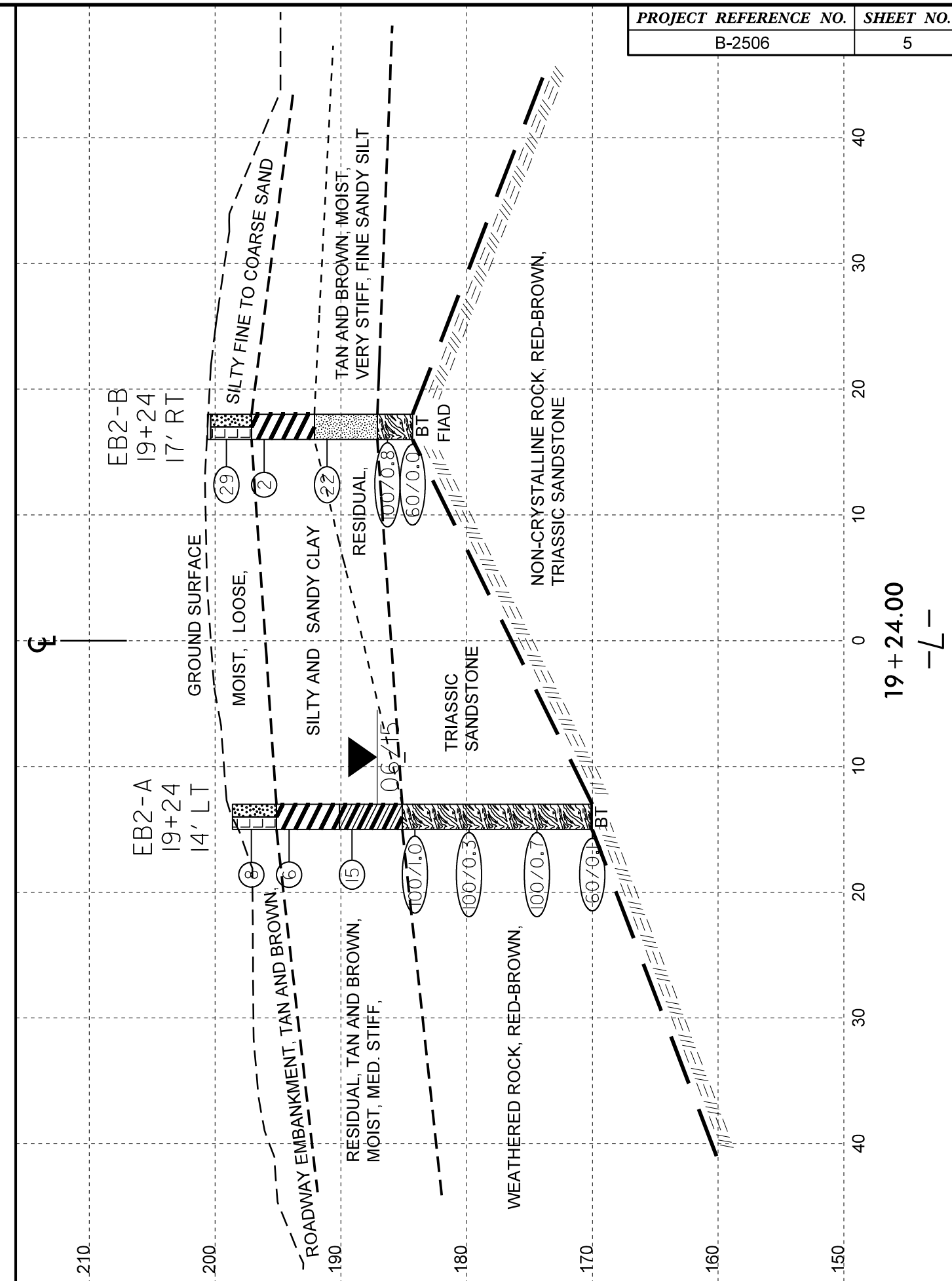
18+00 19+00



HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH END BENT 1 STA. 18+02 -L-



HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH END BENT 2 STA 19+24

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 32638.1.1 | | TIP B-2506 | | COUNTY ANSON | | GEOLOGIST M. Walko | | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|-----|---------------------------|------------|--|
| SITE DESCRIPTION Bridge 008 on SR 1627 (Pinkston River Road) over Brown Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-A | | STATION 18+03 | | OFFSET 15 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 203.3 ft | | TOTAL DEPTH 43.7 ft | | NORTHING 479,812 | | EASTING 1,684,988 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 01/15/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER B. Boyce | | START DATE 06/11/15 | | COMP. DATE 06/11/15 | | 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) | |
| 205 | | | | | | | | | | | | | | | 203.3 | GROUND SURFACE |
| | 202.8 | 0.5 | 3 | 4 | 4 | | | | | | | | | | | ROADWAY EMBANKMENT |
| 200 | 199.8 | 3.5 | 15 | 12 | 4 | | | | | | | | | | | Tan and brown, moist, loose, silty fine to coarse SAND (A-2-4) |
| 195 | 194.8 | 8.5 | 3 | 3 | 4 | | | | | | | | | | 194.8 | ALLUVIAL |
| | | | | | | | | | | | | | | | | Tan and brown, moist, medium stiff, fine sandy CLAY (A-6(10)) |
| 190 | 189.8 | 13.5 | 2 | 4 | 4 | | | | | | | | | | | Trace to little wood from 18.5 to 23.5 feet |
| 185 | 184.8 | 18.5 | 2 | 1 | 7 | | | | | | | | | | | |
| 180 | 179.8 | 23.5 | 60/0.1 | | | | | | | | | | | | 180.3 | NON-CRYSTALLINE ROCK |
| | | | | | | | | | | | | | | | | Red-brown TRIASSIC SANDSTONE |
| 175 | 174.8 | 28.5 | 59 | 26 | 33 | | | | | | | | | | 177.3 | TRIASSIC RESIDUAL |
| | | | | | | | | | | | | | | | | Red-brown, dry, very dense, silty fine to coarse SAND (A-2-4) |
| 170 | 169.8 | 33.5 | 100/0.4 | | | | | | | | | | | | 169.8 | WEATHERED ROCK |
| | | | | | | | | | | | | | | | | Red-brown severely weathered TRIASSIC SANDSTONE |
| 165 | 164.8 | 38.5 | 100/0.4 | | | | | | | | | | | | | |
| 160 | 159.8 | 43.5 | 100/0.2 | | | | | | | | | | | | 159.6 | Boring Terminated at Elevation 159.6 ft In Weathered Rock (Triassic Sandstone) |
| | | | | | | | | | | | | | | | | 1) Driller indicated hard drilling from 23 to 26 feet. |

| WBS 32638.1.1 | | TIP B-2506 | | COUNTY ANSON | | GEOLOGIST M. Walko | | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|-----|---------------------------|------------|---|
| SITE DESCRIPTION Bridge 008 on SR 1627 (Pinkston River Road) over Brown Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB1-B | | STATION 18+02 | | OFFSET 17 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 203.5 ft | | TOTAL DEPTH 25.5 ft | | NORTHING 479,802 | | EASTING 1,684,958 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 01/15/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER B. Boyce | | START DATE 06/11/15 | | COMP. DATE 06/11/15 | | 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) | |
| 205 | | | | | | | | | | | | | | | 203.5 | GROUND SURFACE |
| | 202.5 | 1.0 | 11 | 8 | 5 | | | | | | | | | | 202.5 | Asphalt (4") Stone Base (8") |
| 200 | 200.0 | 3.5 | 1 | 1 | 1 | | | | | | | | | | 200.0 | ROADWAY EMBANKMENT |
| | | | | | | | | | | | | | | | | Tan and brown, moist, medium dense, silty fine to coarse SAND (A-2-4) |
| 195 | 195.0 | 8.5 | 2 | 2 | 2 | | | | | | | | | | | ALLUVIAL |
| | | | | | | | | | | | | | | | | Tan, brown and gray, moist, soft and medium stiff, fine to coarse sandy CLAY (A-6(14)) |
| 190 | 190.0 | 13.5 | 2 | 3 | 3 | | | | | | | | | | | Trace to little wood from 18.5 to 23.5 feet |
| 185 | 185.0 | 18.5 | 1 | 2 | 1 | | | | | | | | | | | |
| 180 | 180.0 | 23.5 | 60/0.1 | | | | | | | | | | | | 181.5 | NON-CRYSTALLINE ROCK |
| | | | | | | | | | | | | | | | | Red-brown TRIASSIC SANDSTONE |
| | 178.0 | 25.5 | 60/0.0 | | | | | | | | | | | | 178.0 | Boring Terminated with Standard Penetration Test Refusal at Elevation 178.0 ft In Non-Crystalline Rock (Triassic Sandstone) |
| | | | | | | | | | | | | | | | | 1) Driller indicated hard drilling at 22 feet. |

NCDOT BORE DOUBLE B2506_BRDG008.GPJ NC_DOT.GDT 8/4/15

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 32638.1.1 | | TIP B-2506 | | COUNTY ANSON | | GEOLOGIST M. Walko | | | | | | | | | | | |
|--|-----------------|---------------------|------------|-------------------------------|-------|---------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--------------------------|---|------|
| SITE DESCRIPTION Bridge 008 on SR 1627 (Pinkston River Road) over Brown Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | | |
| BORING NO. B1-B | | STATION 18+56 | | OFFSET 7 ft RT | | ALIGNMENT -L- | 0 HR. N/A | | | | | | | | | | |
| COLLAR ELEV. 188.4 ft | | TOTAL DEPTH 43.7 ft | | NORTHING 479,754 | | EASTING 1,684,985 | 24 HR. N/A | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 01/15/2015 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER B. Boyce | | START DATE 06/12/15 | | COMP. DATE 06/12/15 | | SURFACE WATER DEPTH 1.6ft | | | | | | | | | | | |
| 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) | | | |
| 190 | | | | | | | | | | | | | | | WATER SURFACE (06/12/15) | | |
| | | | | | | | | | | | | | | | 188.4 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | | | ALLUVIAL | |
| 185 | 184.9 | 3.5 | 100/0.3 | | | | | | | | | | | | 184.9 | Tan silty fine to coarse SAND (A-2-4) | 3.5 |
| | | | | | | | | | | | | | | | | WEATHERED ROCK | |
| | | | | | | | | | | | | | | | | Red-brown severely weathered TRIASSIC SANDSTONE | |
| 180 | 179.9 | 8.5 | 100/0.3 | | | | | | | | | | | | | | |
| 175 | 174.9 | 13.5 | 100/0.2 | | | | | | | | | | | | | | |
| 170 | 169.9 | 18.5 | 100/0.3 | | | | | | | | | | | | | | |
| 165 | 164.9 | 23.5 | 100/0.2 | | | | | | | | | | | | | | |
| 160 | 159.9 | 28.5 | 100/0.2 | | | | | | | | | | | | | | |
| 155 | 154.9 | 33.5 | 90/10/0.1 | | | | | | | | | | | | | | |
| 150 | 149.9 | 38.5 | 100/0.5 | | | | | | | | | | | | | | |
| 145 | 144.9 | 43.5 | 100/0.2 | | | | | | | | | | | | 144.7 | | 43.7 |
| Boring Terminated at Elevation 144.7 ft In Weathered Rock (Triassic Sandstone) | | | | | | | | | | | | | | | | | |
| 1) Advanced 2-15/16 in. Tricone Bit to 43.7 ft. 2) Advanced N Casing to 3.5 ft., 17 ft. total used. 3) Creek Water Used as Drilling Fluid. 4) Drilled through bridge deck, 13.4 ft. from Deck to Water Surface. 5) Depth of Water, 1.6 ft. | | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE B2506_GEO_BRDG008.GPJ NC_DOT.GDT 8/4/15

GEOTECHNICAL BORING REPORT

BORE LOG

| WBS 32638.1.1 | | TIP B-2506 | | COUNTY ANSON | | GEOLOGIST M. Walko | | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Bridge 008 on SR 1627 (Pinkston River Road) over Brown Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-A | | STATION 19+24 | | OFFSET 14 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 201.6 ft | | TOTAL DEPTH 28.6 ft | | NORTHING 479,697 | | EASTING 1,685,028 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 01/15/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER B. Boyce | | START DATE 06/11/15 | | COMP. DATE 06/11/15 | | 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 | | | | | | |
| 205 | | | | | | | | | | | | | | | | |
| 200 | 201.1 | 0.5 | 2 | 4 | 4 | | | | | | | | | 201.6 | 0.0 | GROUND SURFACE |
| | 198.1 | 3.5 | 3 | 3 | 3 | | | | | | | | | 198.1 | 3.5 | ROADWAY EMBANKMENT Tan and brown, moist, loose, silty fine to coarse SAND (A-2-4) |
| 195 | 193.1 | 8.5 | 4 | 6 | 9 | | | | | | | | | 193.1 | 8.5 | RESIDUAL Tan and brown, moist, medium stiff, silty CLAY (A-7-5) |
| 190 | 188.1 | 13.5 | 15 | 85/0.5 | | | | | | | | | | 188.1 | 13.5 | Tan, moist, stiff, fine sandy CLAY (A-6(6)) |
| 185 | 183.1 | 18.5 | 100/0.3 | | | | | | | | | | | 183.1 | 18.5 | WEATHERED ROCK Red-brown severely weathered TRIASSIC SANDSTONE |
| 180 | 178.1 | 23.5 | 49 | 51/0.2 | | | | | | | | | | 178.1 | 23.5 | |
| 175 | 173.1 | 28.5 | 60/0.1 | | | | | | | | | | | 173.1 | 28.5 | NON-CRYSTALLINE ROCK Red-brown TRIASSIC SANDSTONE |
| | | | | | | | | | | | | | | 173.0 | 28.6 | Boring Terminated with Standard Penetration Test Refusal at Elevation 173.0 ft In Non-Crystalline Rock (Triassic Sandstone) |

| WBS 32638.1.1 | | TIP B-2506 | | COUNTY ANSON | | GEOLOGIST M. Walko | | | | | | | | | | |
|---|-----------------|---------------------|--------------------------|---------------------|-----------------------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Bridge 008 on SR 1627 (Pinkston River Road) over Brown Creek | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-B | | STATION 19+24 | | OFFSET 17 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 203.3 ft | | TOTAL DEPTH 16.3 ft | | NORTHING 479,687 | | EASTING 1,684,999 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 01/15/2015 | | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | | | | | | | | | | | |
| DRILLER B. Boyce | | START DATE 06/11/15 | | COMP. DATE 06/11/15 | | 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 | | | | | | |
| 205 | | | | | | | | | | | | | | | | |
| 200 | 202.8 | 0.5 | 19 | 16 | 13 | | | | | | | | | 202.8 | 0.5 | GROUND SURFACE |
| | 199.8 | 3.5 | 1 | 1 | 1 | | | | | | | | | 199.8 | 3.5 | ROADWAY EMBANKMENT Asphalt (3") Tan and brown, moist, medium dense, silty fine to coarse SAND (A-2-4) |
| 195 | 194.8 | 8.5 | 6 | 10 | 12 | | | | | | | | | 194.8 | 8.5 | RESIDUAL Tan and red-brown, moist, soft, silty CLAY (A-7-5) |
| 190 | 189.8 | 13.5 | 10 | 90/0.3 | | | | | | | | | | 189.8 | 13.5 | Tan and brown, moist, very stiff, fine sandy SILT (A-4(0)) |
| | 187.0 | 16.3 | 60/0.0 | | | | | | | | | | | 187.0 | 16.3 | WEATHERED ROCK Red-brown severely weathered TRIASSIC SANDSTONE |
| | | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 187.0 ft On Non-Crystalline Rock (Triassic Sandstone) |

NCDOT BORE DOUBLE B2506_GEO_BRDG008.GPJ NC_DOT.GDT 8/4/15

**North Carolina Department of Transportation
Division of Highways
Materials and Test Unit
Soils Laboratory**

T.I.P. ID NO.: B-2506
DESCRIPTION: Bridge 8 on SR 1627 over Brown Creek

REPORT ON SAMPLES OF: SOIL FOR QUALITY

| | |
|-------------------------------|--------------------------|
| PROJECT: <u>32638.1.1</u> | COUNTY: <u>Anson</u> |
| DATE SAMPLED: <u>6/11/15</u> | RECEIVED: <u>6/15/15</u> |
| SAMPLED FROM: <u>On Site</u> | REPORTED: <u>7/7/15</u> |
| SUBMITTED BY: <u>M. Walko</u> | BY: <u>A. Roth</u> |

| PROJ. SAMPLE NO. | SS-3 | SS-7 | SS-14 | SS-21 | | | |
|----------------------|-------|-------|-------|-------|--|--|--|
| BORING NO. | EB2-B | EB2-A | EB1-B | EB1-A | | | |
| Retained #4 Sieve % | 0.0 | 0.0 | 0.0 | 0.0 | | | |
| Passing #10 Sieve % | 100.0 | 100.0 | 100.0 | 100.0 | | | |
| Passing #40 Sieve % | 99.0 | 99.0 | 98.0 | 97.0 | | | |
| Passing #200 Sieve % | 52.0 | 69.0 | 85.0 | 68.0 | | | |

| | | | | | | | |
|-------------------------|--------|--------|---------|---------|--|--|--|
| SOIL MORTAR - 100% | | | | | | | |
| Coarse Sand Ret - #60 % | 5.0 | 4.3 | 4.3 | 8.3 | | | |
| Fine Sand Ret - #270 % | 52.7 | 34.4 | 15.4 | 29.1 | | | |
| Silt 0.053 - 0.010 mm % | 29.2 | 34.2 | 42.0 | 35.5 | | | |
| Clay < 0.010 mm % | 13.1 | 27.1 | 38.3 | 27.1 | | | |
| L.L. | 19 | 28 | 35 | 36 | | | |
| P.L. | 20 | 15 | 18 | 19 | | | |
| P.I. | NP | 13 | 17 | 17 | | | |
| AASHTO Classification | A-4(0) | A-6(6) | A-6(14) | A-6(10) | | | |
| Station | 19+24 | 19+24 | 18+02 | 18+03 | | | |
| Offset | 17 RT | 14 LT | 17 RT | 15 LT | | | |
| Depth (ft) | 8.5 | 8.5 | 8.5 | 13.5 | | | |
| to | 10.0 | 10.0 | 10.0 | 15.0 | | | |
| Moisture Content (%) | 17.5 | 17.2 | 23.9 | 19.0 | | | |

NP=Not plastic

Michael J. Walko, P.E.
Soils Engineer

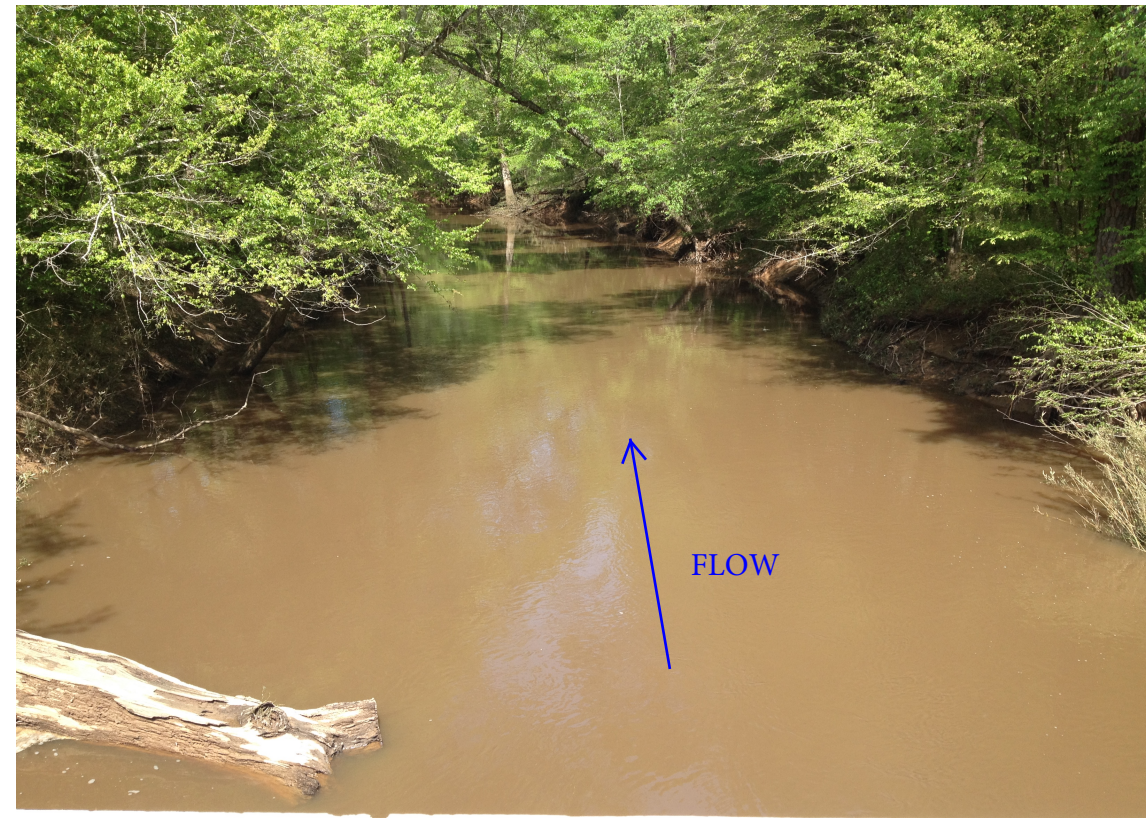
SITE PHOTOGRAPHS



VIEW OF BRIDGE 008 LOOKING NORTH



VIEW OF BRIDGE 008 LOOKING SOUTH



VIEW OF BROWN CREEK LOOKING DOWNSTREAM



VIEW OF BROWN CREEK LOOKING UPSTREAM