STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	15BPR.20	1	10

REFERENCE:

PROJECT: 15BPR.20

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY HENDERSON

PROJECT DESCRIPTION 440108 AND 440112
I-26, GREEN RIVER CROSSING
STRUCTURE REHABILITATION

SITE DESCRIPTION
SPECIFIC INVENTORY FOR FOUNDATION RECOMMENDATIONS
BETWEEN EXISTING END ABUTMENTS

CONTENTS

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.

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PERSONNEL

JC KUHNE

CD JOHNSON

C COFFEY

INVESTIGATED BY JC KUHNE

DRAWN BY JC KUHNE

CHECKED BY

SUBMITTED BY JC KUHNE

DATE

NORTH CAROLINA LICENSED SEAL 1878 GEOLOGIST JODY C KUHNE

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Jody C. Kuhne
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SIGNATURE

2/22/2019
DATE

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PROJECT REFERENCE NO.	SHEET NO.
15BPR.20	2

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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				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	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY 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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	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

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- 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

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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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 _____" 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 YEILD 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 GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED 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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

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 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 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 (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.

BENCH MARK:

ELEVATION: FEET

NOTES:

DATE: 8-15-14

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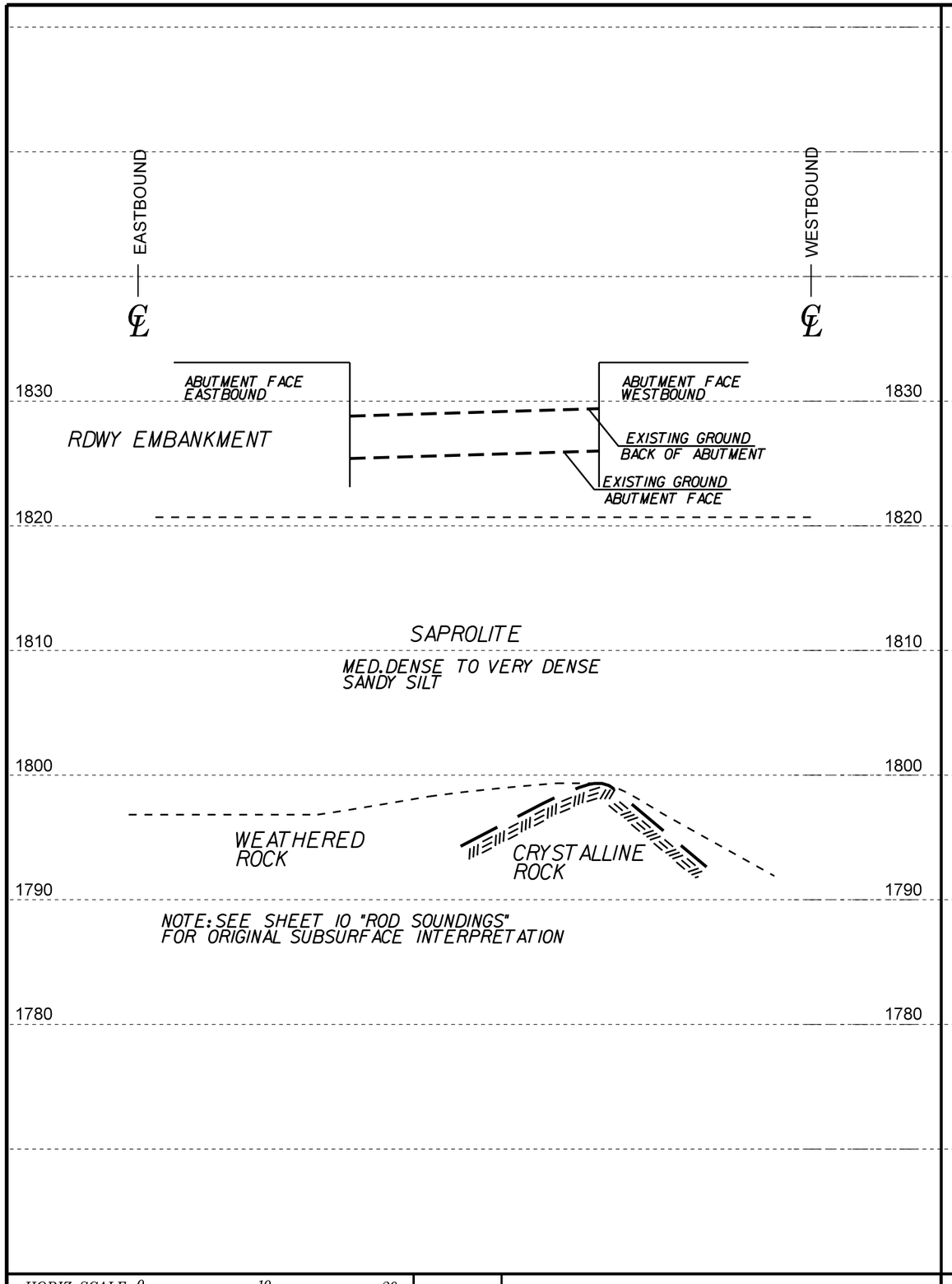
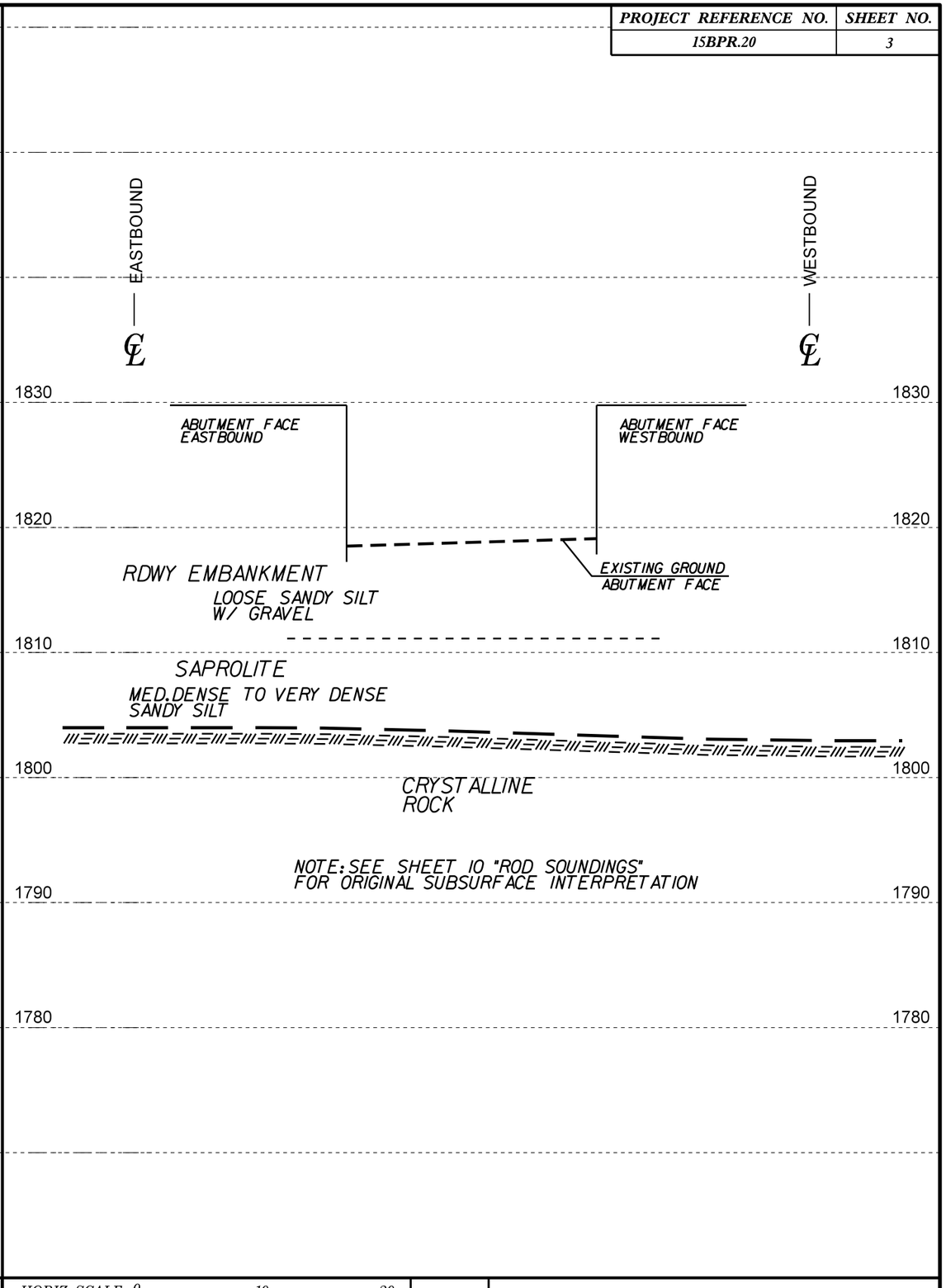
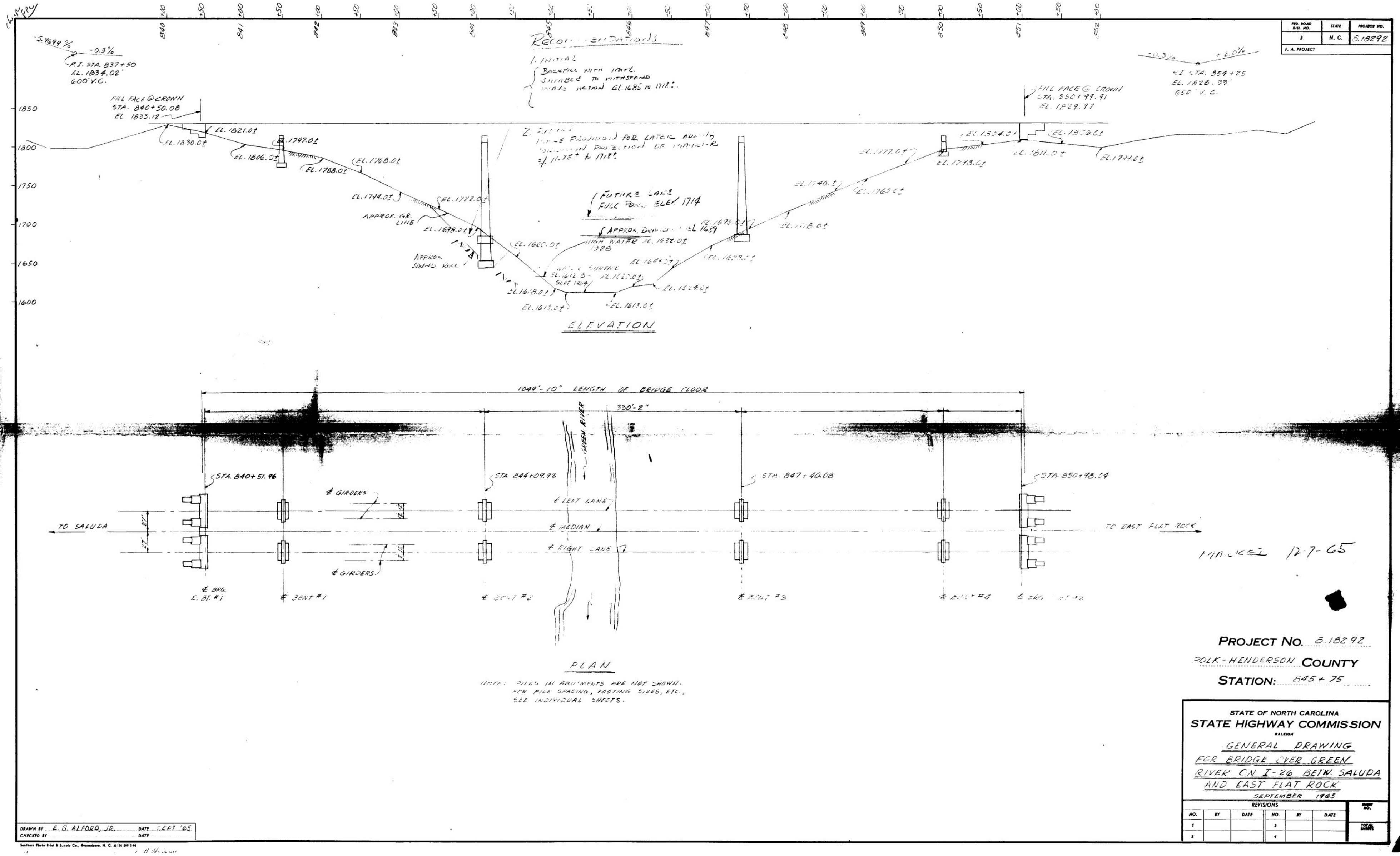
15BPR.20	3



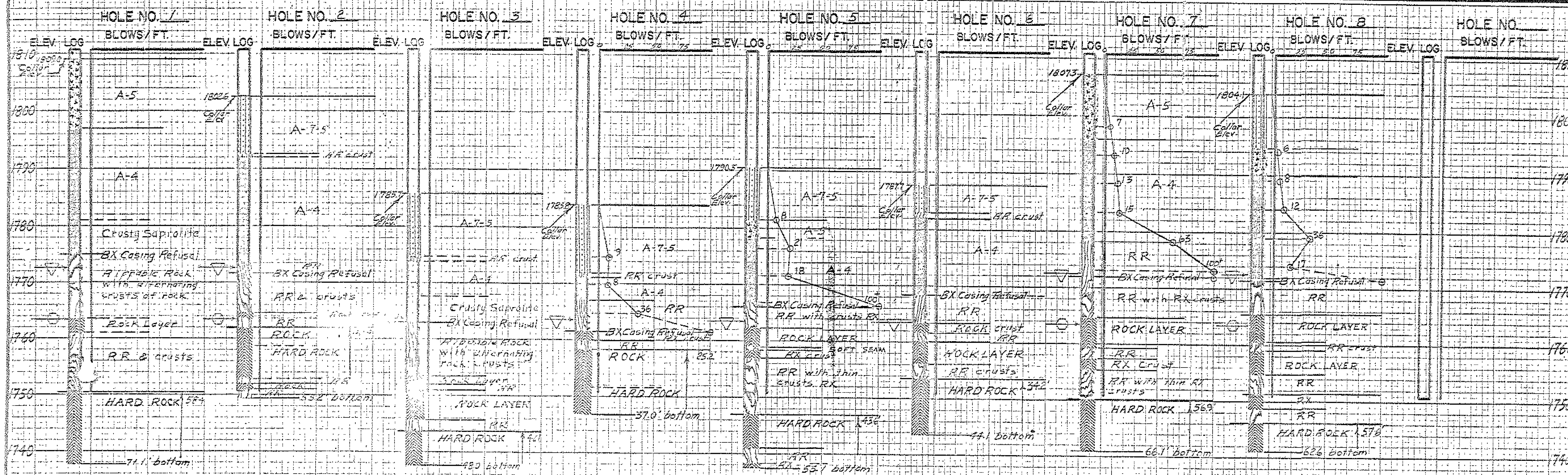
HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION THROUGH SOUTH ABUTMENT**

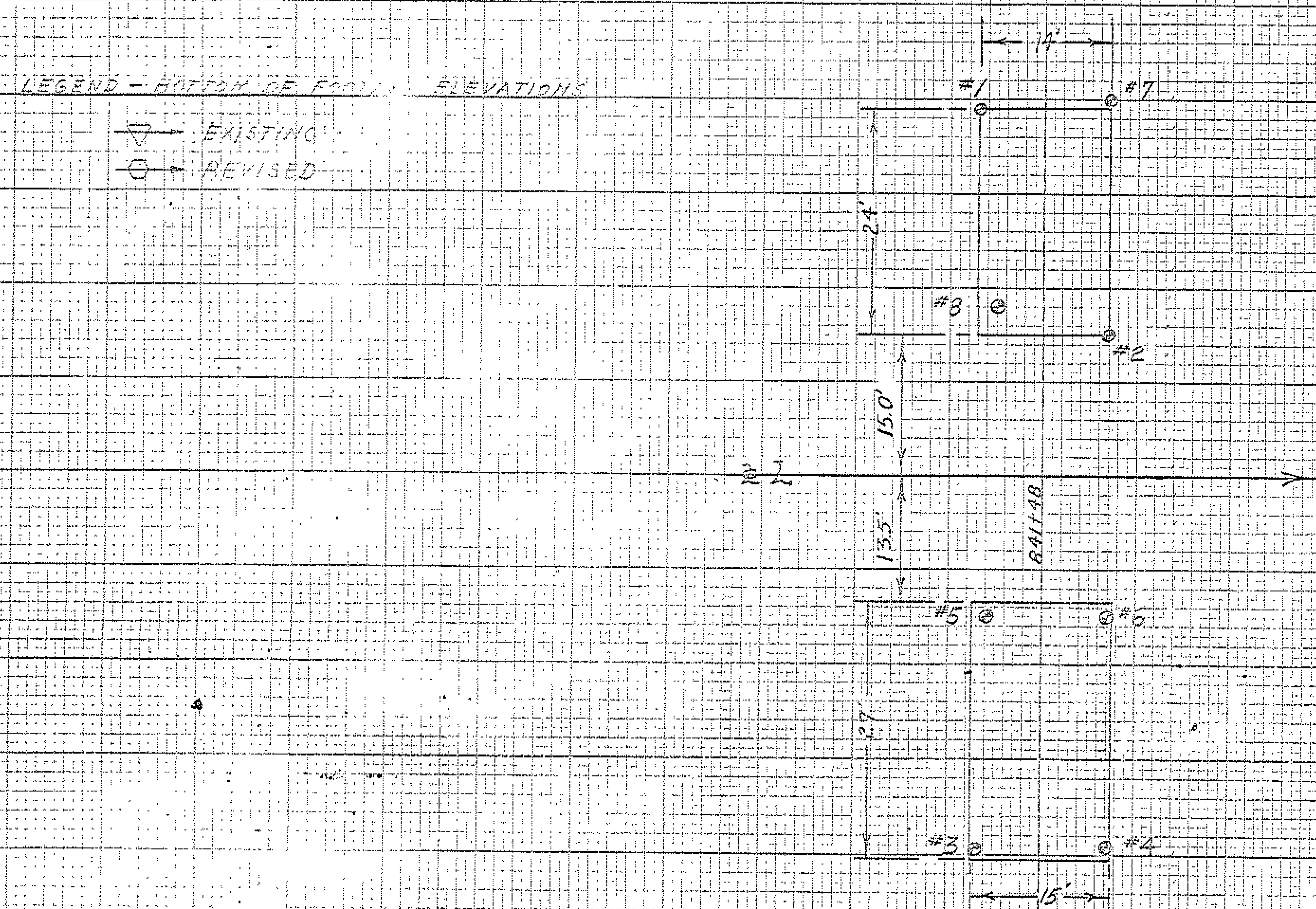


HORIZ. SCALE (FEET) 0 10 20 | VE = 1:1 | **SECTION THROUGH NORTH ABUTMENT**


FED. ROAD DIST. NO. 3
STATE N. C.
PROJECT NO. 8.18292
F. A. PROJECT
-0.3%
P.I. STA. 837+50
EL. 1834.02
600' V.C.
FILL FACE @ CROWN
STA. 840+50.08
EL. 1833.12
RECOMMENDATIONS
1. INITIAL
BACKFILL WITH MAT'L.
SUITABLE TO WITHSTAND
WAVE ACTION EL. 1685 TO 1718±.
FILL FACE @ CROWN
STA. 850+99.91
EL. 1829.97
P.I. STA. 854+25
EL. 1826.99
650' V.C.
1850
1800
1750
1700
1650
1600
EL. 1821.0±
EL. 1830.0±
EL. 1797.0±
EL. 1806.0±
EL. 1788.0±
EL. 1768.0±
EL. 1744.0±
EL. 1722.0±
APPROX. GR. LINE
EL. 1698.0±
APPROX. SOUND ROCK
EL. 1660.0±
FUTURE LAKE FULL POND ELEV 1714
HIGH WATER EL. 1632.0±
1928
EL. 1618.0±
EL. 1613.0±
EL. 1613.0±
EL. 1740.0±
EL. 1793.0±
EL. 1811.0±
EL. 1794.0±
ELEVATION
1049'-10" LENGTH OF BRIDGE FLOOR
330'-2"
GREEN RIVER
STA. 840+51.96
STA. 844+09.92
STA. 847+40.08
℄ GIRDERS
TO SALUDA
℄ LEFT LANE
℄ MEDIAN
℄ RIGHT LANE
TO EAST FLAT ROCK
℄ GIRDERS
℄ BRG. E. BT. #1
℄ BENT #1
℄ BENT #3
PLAN
NOTE: PILES IN ABUTMENTS ARE NOT SHOWN. FOR PILE SPACING, FOOTING SIZES, ETC., SEE INDIVIDUAL SHEETS.
PROJECT NO. 8.18292
POLK-HENDERSON COUNTY
STATION: 845+75
STATE OF NORTH CAROLINA
STATE HIGHWAY COMMISSION
RALEIGH
GENERAL DRAWING
FOR BRIDGE OVER GREEN RIVER ON I-26 BETW. SALUDA AND EAST FLAT ROCK
SEPTEMBER 1965
REVISIONS
NO.
BY
DATE
1
2
3
4
SHEET NO.
TOTAL SHEETS
DRAWN BY E. G. ALFORD, JR.
DATE SEPT '65
CHECKED BY
DATE

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N. C.	81829201	1	
F. A. PROJ. NO.			


HOLE NO. 1
BLOWS/FT.
ELEV. LOG
A-5
A-4
Crusty Saprolite
BX Casing Refusal
Rippable Rock with alternating crusts of rock
Rock Layer
R.R. & crusts
HARD ROCK
71.1' bottom
HOLE NO. 2
1802.5 Collar Elev.
A-7-5
RR crust
A-4
BX Casing Refusal
R.R. & crusts
RR
ROCK
HARD ROCK
55.2' bottom
HOLE NO. 3
1785.7 Collar Elev.
A-7-5
RR crust
A-4
Crusty Saprolite
BX Casing Refusal
Rippable Rock with alternating rock crusts
Rock Layer
ROCK LAYER
HARD ROCK
48.0' bottom
HOLE NO. 4
1785.8 Collar Elev.
A-7-5
RR crust
A-4
RR
BX Casing Refusal
ROCK
HARD ROCK
57.0' bottom
HOLE NO. 5
1790.5 Collar Elev.
A-7-5
A-5
A-4
BX Casing Refusal
R.R. with crusts RX
ROCK LAYER
RX crust
SOFT SEAM
R.R. with thin crusts RX
HARD ROCK
53.7' bottom
HOLE NO. 6
1787.7 Collar Elev.
A-7-5
RR crust
A-4
BX Casing Refusal
R.R.
Rock crust
ROCK LAYER
RR crusts
HARD ROCK
44.1' bottom
HOLE NO. 7
1807.3 Collar Elev.
A-5
A-4
RR
BX Casing Refusal
RR with RX crusts
ROCK LAYER
RR
RX Crust
RR with thin RX crusts
HARD ROCK
66.1' bottom
HOLE NO. 8
1804.1 Collar Elev.
BX Casing Refusal
RR
ROCK LAYER
RR crust
ROCK LAYER
RR
RX
RR
HARD ROCK
58.6' bottom
HOLE NO.
BLOWS/FT.



Bent #1

Drill Hole Location Plan

LEGEND

SOIL & ROCK DESCRIPTION & SYMBOLS

- Red Silty Clay A-7-5
- Brown Mica Silt A-5
- Saprolite A-4
- Rippable Rock RR
- HARD ROCK RX

NOTES

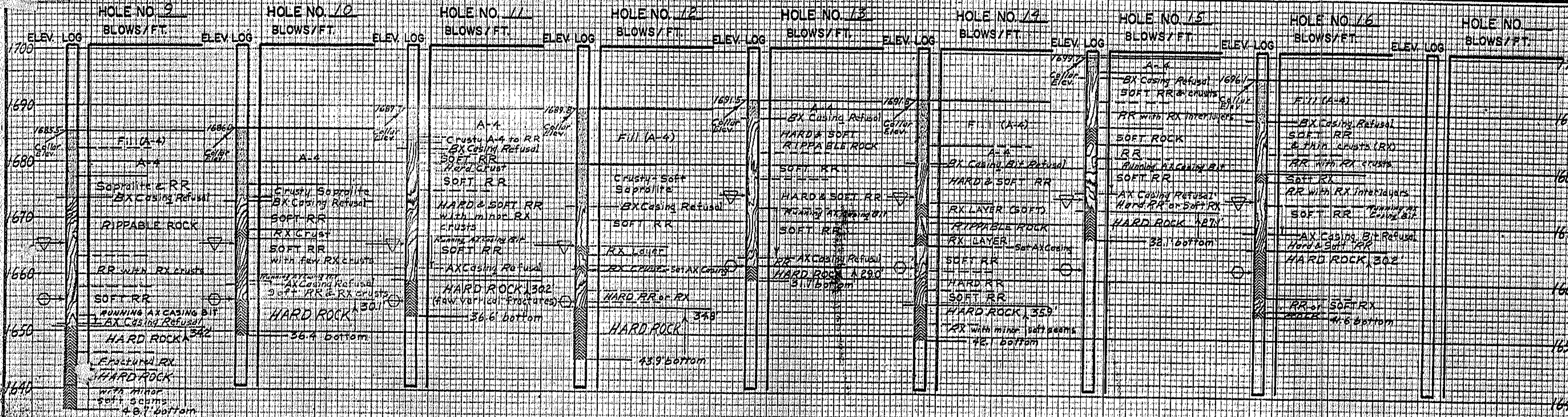
THE LOGS SHOWN ON THIS PROFILE ARE TAKEN FROM FIELD SURVEY DATA AND REPRESENT THE BEST INFORMATION AVAILABLE. FIELD PROCEDURES ARE BASED ON A.S.T.M. AND A.A.S.H.O. STANDARDS WITH BEARING CAPACITIES DERIVED FROM STANDARD PENETRATION TEST: 140 LB. HAMMER, 30 IN. FALL, 2 IN. SAMPLER.

NORTH CAROLINA
STATE HIGHWAY COMMISSION
DEPARTMENT OF LOCATIONS & SURVEYS
GEOLOGICAL DIVISION
BRIDGE FOUNDATION SURVEY

PROJECT 81829201
COUNTY HENDERSON
ROUTE I-26
BRIDGE ON I-26
OVER GREEN RIVER
SCALE: HORIZONTAL 1" = 10' VERTICAL 1" = 10'
SURVEY BY J. L. Sharpe (PARTY CHIEF)
ANALYSIS & REPORT BY (AREA GEOLOGIST)
SUBMITTED BY [illegible] (STATE HIGHWAY GEOLOGIST)

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N. C.	8.1829201	2	

F. A. PROJ. NO.



LEGEND

SOIL & ROCK DESCRIPTION & SYMBOLS

Silty-Sandy Saprolite (A-4)

Rippable Rock RR

HARD ROCK RX

NOTES

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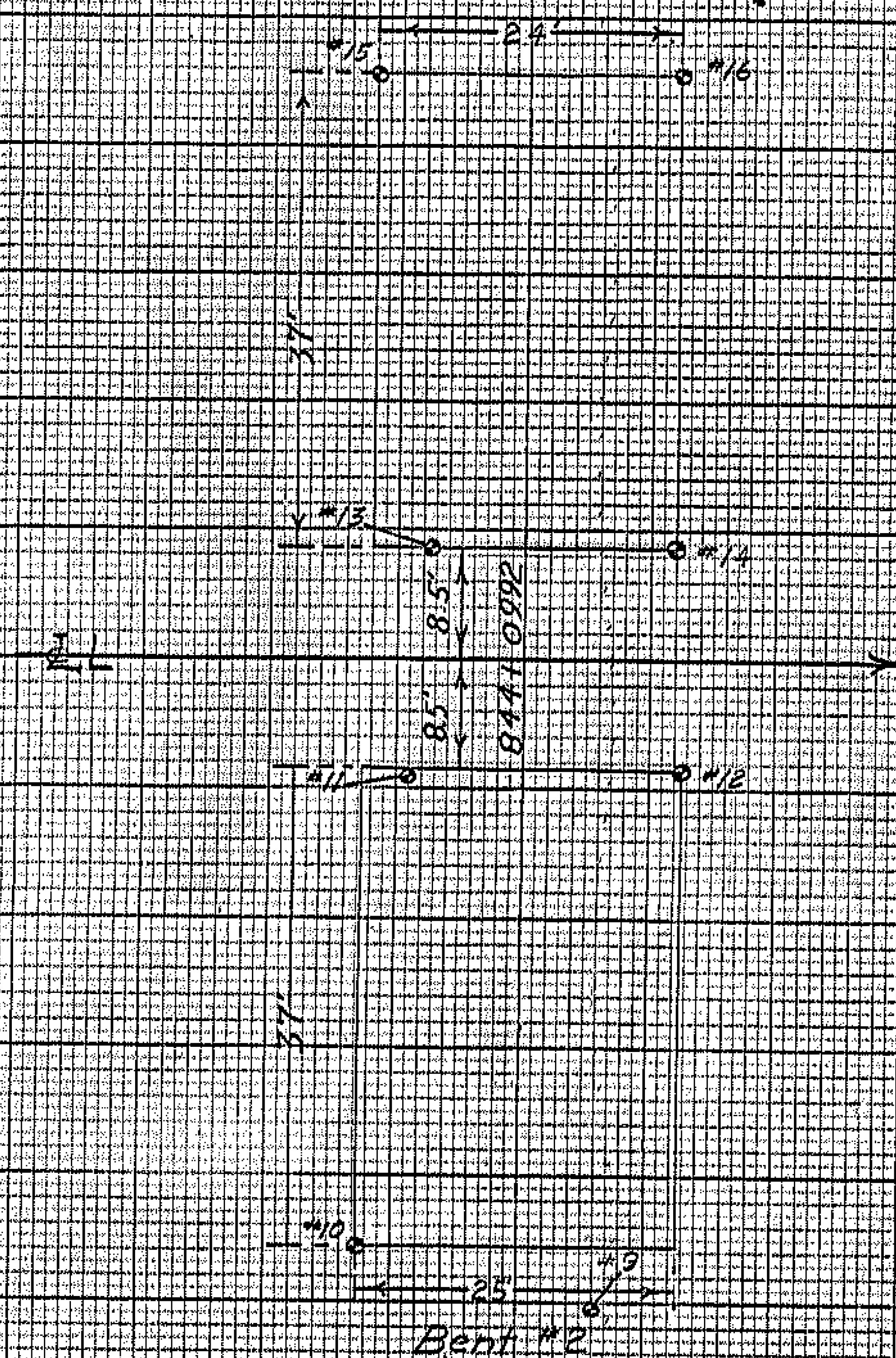
GENERAL
(1) BX Casing Bit Ran to refusal, BX Casing Set
(2) BX Diamond Bit Ran Safe Limit Below Casing
(3) AX Casing either Set or Ran to Refusal
(4) AX Diamond Bit Ran
Note: AX Core generally more broken up and at times lost due to grinding of core when barrel is blocked. BX Core recovery is greater especially in Soft Rock or Rock with Weak Seams or Joints.

LEGEND - BOTTOM OF FOOTING ELEVATIONS

▽ EXISTING

○ REVISED



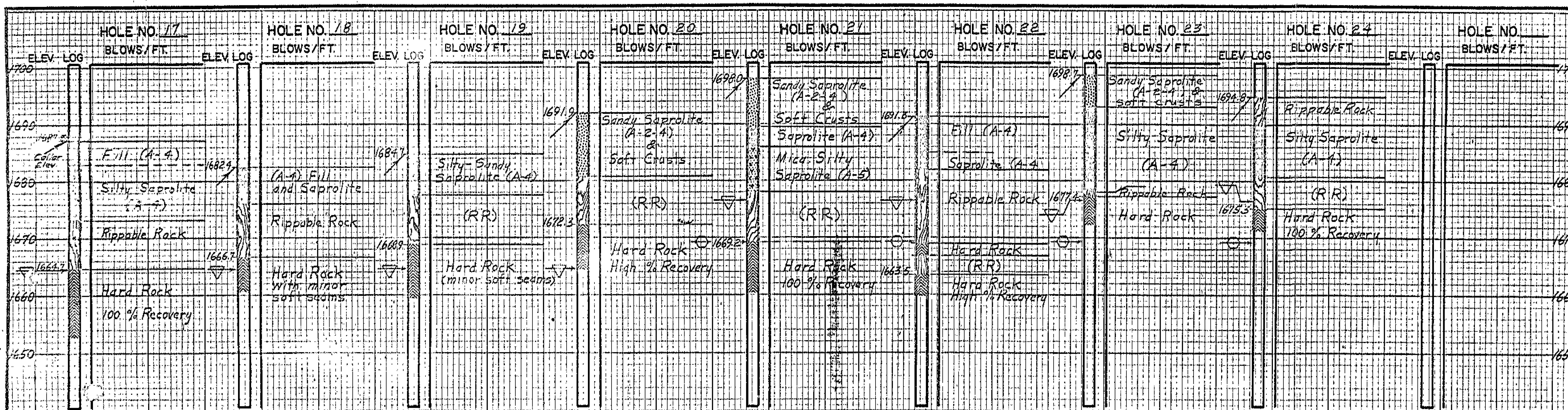
Drill Hole Location Plan

NORTH CAROLINA
STATE HIGHWAY COMMISSION
DEPARTMENT OF LOCATIONS & SURVEYS
GEOLOGICAL DIVISION
BRIDGE FOUNDATION SURVEY

PROJECT 8.1829201
COUNTY HENDERSON
ROUTE I-26
BRIDGE ON I-26
OVER GREEN RIVER
SCALE: HORIZONTAL 1" = 10' VERTICAL 1" = 10'
SURVEY BY J. L. Sharpe (PARTY CHIEF)
ANALYSIS & REPORT BY (AREA GEOLOGIST)
SUBMITTED BY [signature] (STATE HIGHWAY GEOLOGIST)

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	8.1829201	3	

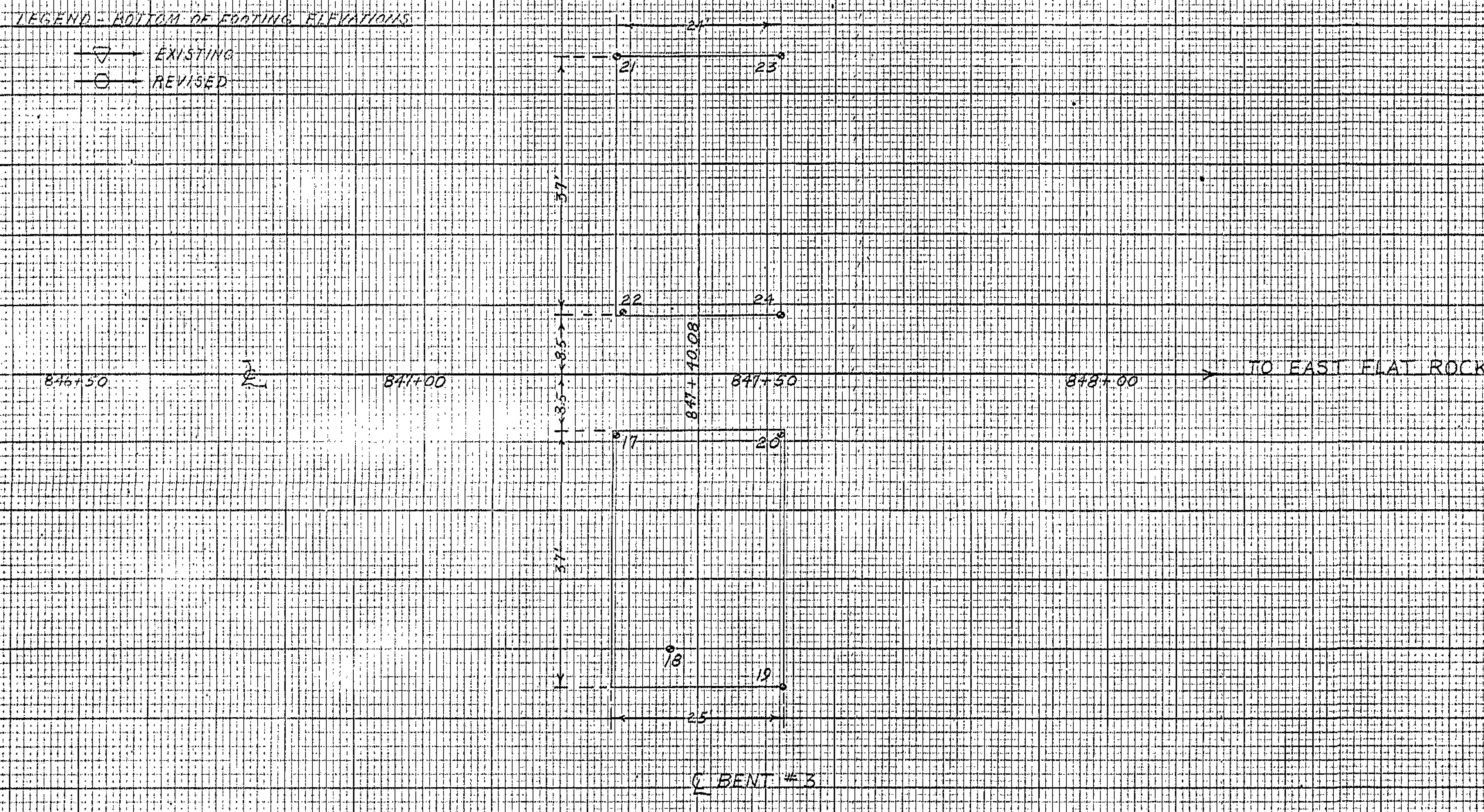
F.A. PROJ. NO.



LEGEND

SOIL & ROCK DESCRIPTION & SYMBOLS

- Sandy Saprolite (A-2-4)
- Silty Saprolite (A-4)
- Micaceous Silty Saprolite (A-5)
- Rippable Rock (RR)
- Hard Rock (RX)



NOTES

THE LOGS SHOWN ON THIS PROFILE ARE TAKEN FROM FIELD SURVEY DATA AND REPRESENT THE BEST INFORMATION AVAILABLE. FIELD PROCEDURES ARE BASED ON A.S.T.M. AND A.A.S.H.O. STANDARDS WITH BEARING CAPACITIES DERIVED FROM STANDARD PENETRATION TEST: 140 LB. HAMMER, 30 IN. FALL, 2 IN. SAMPLER.

Remarks: TYPE OF DRILL BIT USED

Hole #	START	RUNNING	FINISH
17	BX Casing	BX diamond	AX diamond
18	" "	" "	BX diamond
19	" "	" "	" "
20	" "	" "	" "
21	Auger	BX diamond	" "
22	BX Casing	" "	AX diamond
23	Auger	Auger	Auger
24	Auger	Auger	BX diamond

DRILLING RIG:	Holes Bored
(1) B-40 Crawler	17, 18, 19, 20, 22
(2) B-52 Power Auger	21, 23, 24

NOTE: B-52 used 4" auger with specially hardened auger teeth.

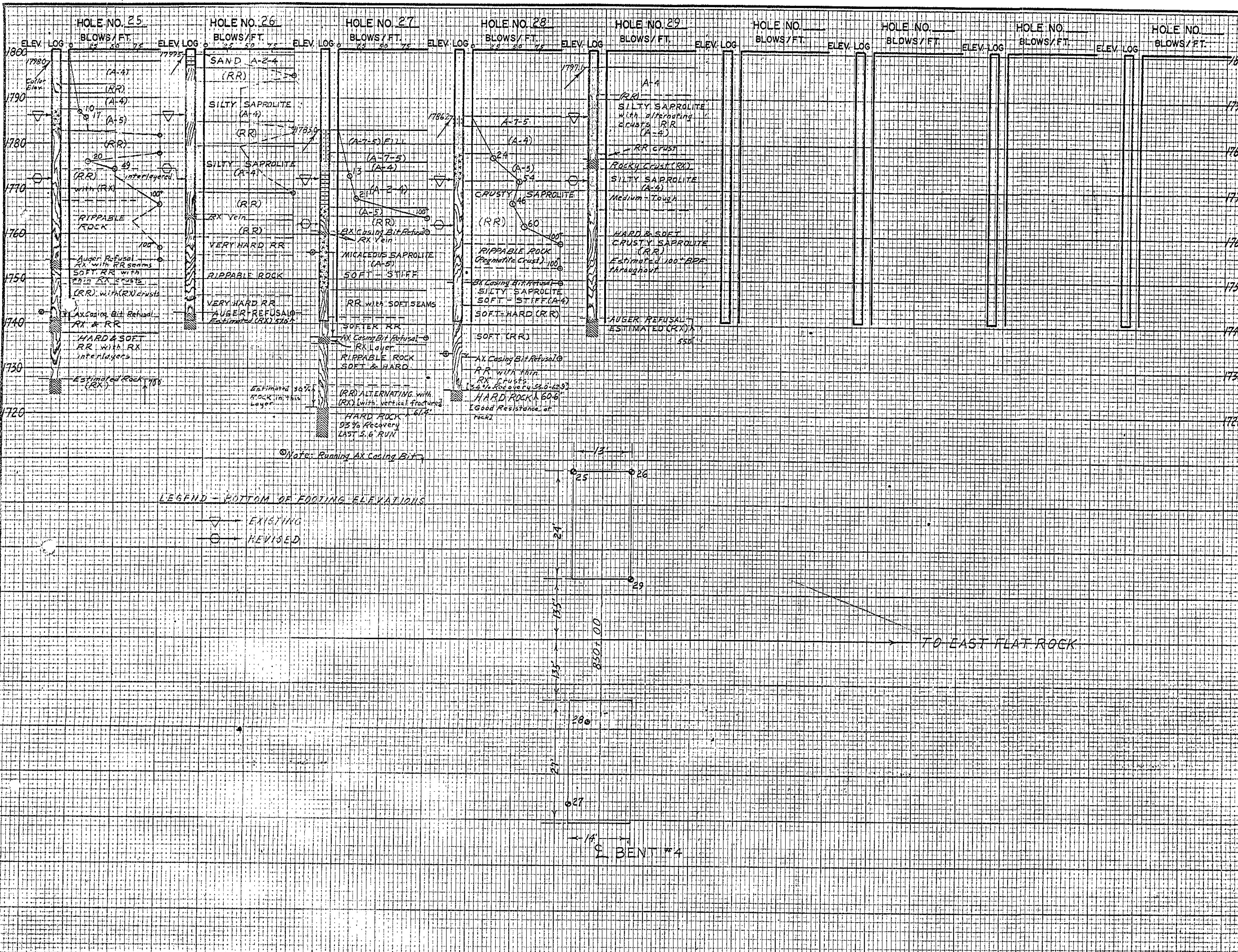
NORTH CAROLINA
STATE HIGHWAY COMMISSION
DEPARTMENT OF LOCATIONS & SURVEYS
GEOLOGICAL DIVISION
BRIDGE FOUNDATION SURVEY

PROJECT 8.1829201
COUNTY HENDERSON
ROUTE I-26
BRIDGE ON I-26
OVER GREEN RIVER
SCALE: HORIZONTAL 1"=10' VERTICAL 1"=10'
SURVEY BY J. L. Sharpe (PARTY CHIEF)
ANALYSIS & REPORT BY (AREA GEOLOGIST)
SUBMITTED BY (STATE HIGHWAY GEOLOGIST)

PLATE 5 - CROSS SECTION U.P.R. & R.L. STANDARD
100% RAG PAPER - MADE AND PRINTED IN U.S.A.
EUGENE DIETZGEN CO., CHARLOTTE, N.C.

STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	8.1829201	4	4

F. A. PROJ. NO.



LEGEND

SOIL & ROCK DESCRIPTION & SYMBOLS

- SILTY CLAY (A-7-5)
- SILTY SAPROLITE (A-4)
- SAND or SAPROLITE (A-2-4)
- MICACEOUS SAPROLITE (A-5)
- RIPPABLE ROCK (RR)
- HARD ROCK (RX)

NOTES

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Drill Rigs Used:

(1) B-52: Holes 25, 26, & 29 drilled with 4" diameter power auger & specially hardened teeth; cased hole #25 at auger refusal; & cored to 720'

(2) B-40 Holes 27 & 28 hydraulic powered crawler; ran only casing & diamond bits; drove samples inside casing.

Note: BPF estimated indicated by dashed line intersection and above at value (circled at 100').

NORTH CAROLINA
STATE HIGHWAY COMMISSION
DEPARTMENT OF LOCATIONS & SURVEYS

GEOLOGICAL DIVISION

BRIDGE FOUNDATION SURVEY

PROJECT 8.1829201

COUNTY HENDERSON

ROUTE I-26

BRIDGE ON I-26

OVER GREEN RIVER

SCALE: HORIZONTAL 1"=10' VERTICAL 1"=10'

SURVEY BY J. L. Sharpe (PARTY CHIEF)

ANALYSIS & REPORT BY (AREA GEOLOGIST)

SUBMITTED BY (STATE HIGHWAY GEOLOGIST)


-0.3%
P.I. STA. 837+50
EL. 1834.02'
600' V.C.
FILL FACE @ CROWN
STA. 840+50.13
EL. 1833.12
SPAN A
SPAN B
SPAN C
SPAN D
SPAN E
FIX
EXP
FILL FACE @ CROWN
STA. 850+99.88
EL. 1829.97
-0.3%
+6.0%
P.I. STA. 854+25
EL. 1820.39'
650' V.C.
ABUTMENT "A"
ABUTMENT "B"
BT. #1
BT. #2
BT. #3
BT. #4
APPROX. GR. LINE
HIGH WATER EL. 1632.0± 1928
WATER SURFACE
TYPICAL DETAIL SHOWING FILL @ ABUTMENT
2:1 SLOPE
BRIDGE ST.
2:1 FILL SLOPE OR SLOPE OF NATURAL GROUND IF FLATTER THAN 2:1
ELEVATION
(GROUND LINE ALONG ℄ MED.)
1099'-9" LENGTH OF BRIDGE FLOOR
97'-11½"
260'-0"
330'-2"
FILL FACE OF SUPERSTRUCTURE AS INDICATED ON SUPERSTRUCTURE DETAILS
STA. 840+51.96
STA. 841+49.92
STA. 844+09.92
STA. 847+40.08
STA. 850+00.08
STA. 850+98.04
TO SALUDA
TO EAST FLAT ROCK
℄ LEFT LANE
℄ MEDIAN
℄ RIGHT LANE
℄ GIRDERS
℄ BRG. ABUTMENT "A"
℄ BENT #1
℄ BENT #2
℄ BENT #3
℄ BENT #4
℄ BRG. ABUTMENT "B"
GREEN RIVER
PLAN
NOTE: PILES IN ABUTMENTS ARE NOT SHOWN. FOR PILE SPACING, FOOTING SIZES, ETC., SEE INDIVIDUAL SHEETS.

PROJECT NO. 8.1829202

HENDERSON COUNTY

STATION: 845+75

STATE OF NORTH CAROLINA
STATE HIGHWAY COMMISSION
RALEIGH

GENERAL DRAWING
FOR BRIDGE OVER GREEN
RIVER ON I-26 BETW. SALUDA
AND EAST FLAT ROCK

SEPTEMBER 1965

REVISIONS						
NO.	BY	DATE	NO.	BY	DATE	
1			3			
2			4			

TOTAL SHEETS 85

FED. ROAD DIST. NO.	STATE	PROJECT NO.
3	N. C.	8.1829204
F. A. PROJECT	I-26-1(14)18	

PROJECT NO. 8.1829204

HENDERSON COUNTY

STATION: 845+75

STATE OF NORTH CAROLINA
STATE HIGHWAY COMMISSION
RALEIGH

ROD SOUNDINGS

SEPTEMBER 1965

REVISIONS						SHEET NO.
NO.	BY	DATE	NO.	BY	DATE	S-4
1			3			TOTAL SHEETS
2			4			65

DRAWN BY E. J. ALFORD, JR. DATE SEPT. 65
CHECKED BY E. H. Wiggins DATE Oct. 1965