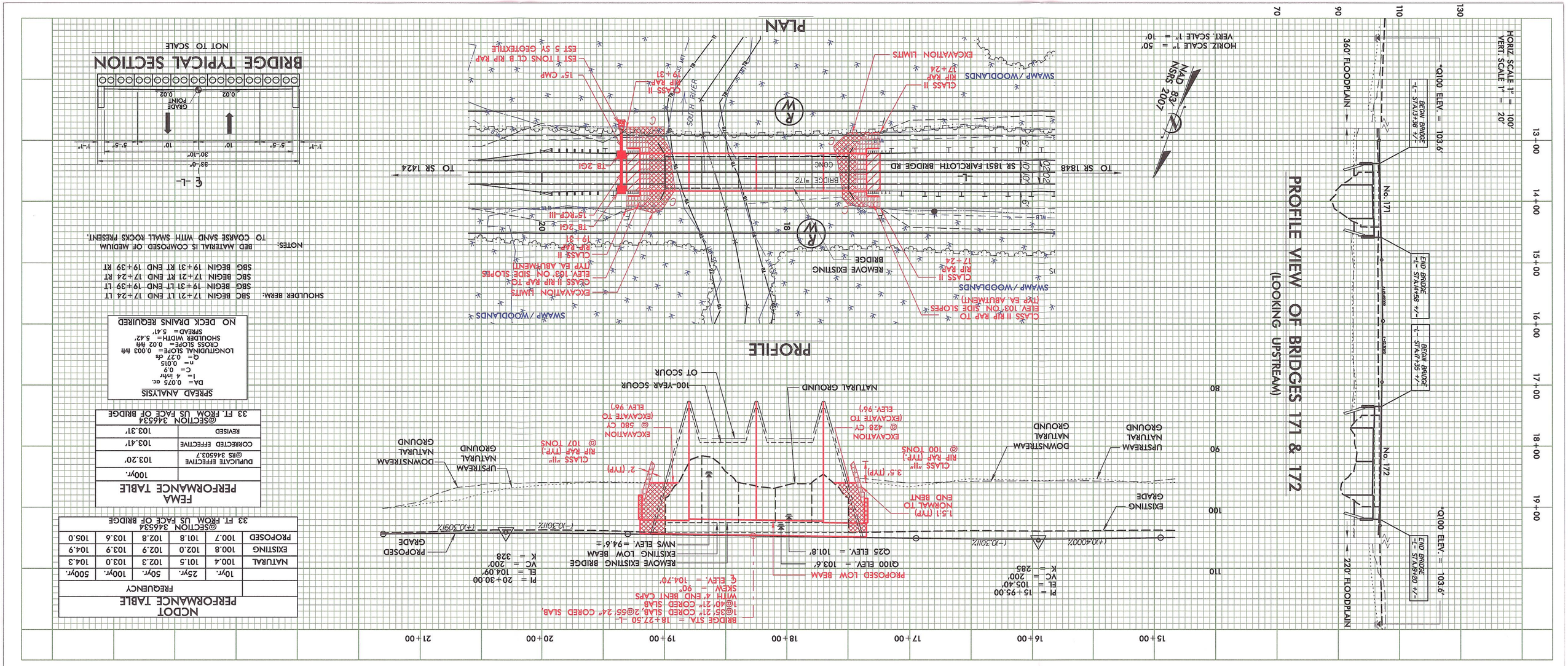


NOTES:
BED MATERIAL IS COMPOSED OF MEDIUM TO COARSE SAND WITH SMALL ROCKS PRESENT.

SHOULDER BERM:
SBC BEGIN 17+21 LT END 17+24 LT
SBG BEGIN 19+31 LT END 19+39 LT
SBC BEGIN 17+21 RT END 17+24 RT
SBG BEGIN 19+31 RT END 19+39 RT

SPREAD ANALYSIS
DA= 0.075 sq.
I= 4 in/hr
C= 0.9
n= 0.015
Q= 0.27 cfs
LONGITUDINAL SLOPE= 0.003 ft/ft
CROSS SLOPE= 0.02 ft/ft
SHOULDER WIDTH= 5.42'
SPREAD= 5.41'

NO DECK DRAINS REQUIRED

NCDOT PERFORMANCE TABLE

	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	100.4	101.5	102.3	103.0	104.3
EXISTING	100.8	102.0	102.9	103.9	104.9
PROPOSED	100.7	101.8	102.8	103.6	105.0

@SECTION 346534
33 FT. FROM US FACE OF BRIDGE

FEMA PERFORMANCE TABLE

	100yr.
DUPLICATE EFFECTIVE @RS 346503.7	103.20'
CORRECTED EFFECTIVE	103.41'
REVISED	103.31'

@SECTION 346534
33 FT. FROM US FACE OF BRIDGE

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 346534

Design: Discharge 6100 c.f.s. Frequency 25 yr. Elev. 101.8 ft.

Base Flood: Discharge 8900 c.f.s. Frequency 100 yr. Elev. 103.6 ft.

Overtopping: Discharge 9700 c.f.s. Frequency 100+ yr. Elev. 104.0 ft.

SAG STA AT 11+85.71

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS SIR 2009–5158 (REGION IV) DRAINAGE AREA = 203 SQ. MI.

Q_{10} = 174 $(DA)^{0.617}$ = 174 $(203)^{0.617}$ = 4600 cfs

Q_{25} = 245 $(DA)^{0.606}$ = 245 $(203)^{0.606}$ = 6100 cfs

Q_{50} = 309 $(DA)^{0.600}$ = 309 $(203)^{0.600}$ = 7500 cfs

Q_{100} = 380 $(DA)^{0.594}$ = 380 $(203)^{0.594}$ = 8900 cfs

Q_{500} = 550 $(DA)^{0.583}$ = 550 $(203)^{0.583}$ = 12000 cfs

FEMA: Q100= 6400 cfs DA= 205 SQ.MI.

SCOUR COMPUTATIONS:

CLEAR WATER CONTRACTION SCOUR: $Y2=[(Ku*Q^2)/(Dm^{2/3}*W^{2\ 3/7})]$ Ys= Y2–Yo

VARIABLES OBTAINED FROM CONTRACTED BRIDGE SECTION D50=2mm Dm=1.25*(D50)

100 YEAR CONTRACTION SCOUR: Yo=5.6'

Q=4699cfs Dm=0.0082' W=187.3' Ku=0.0077

$Y2=[(0.0077*4699^2)/(0.0082^{2/3}*187.3^{2\ 3/7})]$

Y2=7.8' Ys=7.8'–5.6' Ys=2.2'

OT CONTRACTION SCOUR: Yo=5.6'

Q=5121cfs Dm=0.0082' W=187.3' Ku=0.0077

$Y2=[(0.0077*5121^2)/(0.0082^{2/3}*187.3^{2\ 3/7})]$

Y2=8.4' Ys=8.4'–5.6' Ys=2.8'

PIER SCOUR: $Ys=2.0(KI)(K2)(K3)*(a)^{0.65}(Y1)^{0.35}(Fr)^{0.43}$ a=3 K1=1 K2=1 K3=1.1

100–YEAR PIER SCOUR:

Y1=10.2' Fr=0.25

$Ys = 2.0*1*1*1.1*(3)^{0.65}(10.2)^{0.35}(0.25)^{0.43}$ Ys_pier=5.6'

TOTAL SCOUR: Ys = Ys_contr + Ys_pier = 7.8'

OT PIER SCOUR:

Y1=11.6' Fr=0.28

$Ys = 2.0*1*1*1.1*(3)^{0.65}(11.6)^{0.35}(0.28)^{0.43}$ Ys_pier=6.1'

TOTAL SCOUR: Ys = Ys_contr + Ys_pier = 8.9'

*HISTORICAL DATA: MR. HOLLOWAY HAS NEVER SEEN BRIDGE OVERTOP. HE NOTED THAT THE FLOOD LEVEL ALMOST REACHES THE BOTTOM OF BRIDGE WHEN IT RAINS HEAVILY FOR A COUPLE OF DAYS. MR.PITTMAN: THE LOCAL BRIDGE SUPERVISOR (DIV 6) NOTES THAT THE HISTORICAL HIGH WATER REACHED THE BOTTOM OF CAP

THIS PROJECT COMPLIES WITH LOCAL FLOODPLAIN REGULATIONS.

NO STRUCTURES WILL BE ADVERSELY IMPACTED BY WSEL'S FROM THIS PROJECT.

SITE DATA

Drainage Area 203 SQ. MI. Source DELINEATED USGS STREAMSTATS

River Basin CAPE FEAR RIVER Character RURAL

Stream Classification (Such as Trout, High Quality Water, etc.) C;Sw

Data on Existing Structure 1 SPAN @ 30'–3", 3 SPANS @ 30'–1", 1 SPAN @ 30'–3"; PRESTRESSED CONCR CHANNELS ON PPC CAPS /TIMBER PILES Total Waterway Opening 885 s.f. Waterway Opening Below 100yr. WS EL. 885 s.f.

Debris Potential: Low ___ Moderate X High ___

Data on Structures Up and Down Stream U/S: BR 250052 1 SPAN @ 35'–4", 1 SPAN @ 35'–1", 1 SPAN @ 35'–4" STEEL PLANK FLOOR ON TIMBER PILES; HEIGHT CROWN TO BED = 10 FT. D/S: BR 250144 (NC 24) 6 SPANS @ 271'; RC FLOOR W/DECK GIRDERS ON RC ABUTMENTS; HEIGHT CROWN TO BED = 12 FT

Design Control Elev. 103.41 ft. FEMA CORRECTED EFFECTIVE Q100 WSEL @ RS 346534

Gage Station No. N/A Period of Records N/A yrs.

Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information: *SEE ADDITIONAL INFORMATION AND COMPUTATIONS

Date N/A Elev. 102± ft. Est. Freq. 25+ yr. Source LEVONE HOLLOWAY* (LOCAL RESIDENT) Period of Knowledge 8 yrs.

Date N/A Elev. 102± ft. Est. Freq. 25+ yr. Source DARREN PITTMAN* (DIV 6 BRIDGE SUPERVISOR) Period of Knowledge 20+ yrs.

Historical Scour Info. : General N/A ft. Contraction N/A ft. Local N/A ft.

Channel Slope 0.0013 ft/ft Source N/A Normal Water Surface Elev. 94.6± ft.

Manning's n: Left O.B. 0.13 Channel 0.045 Right O.B. 0.13 Source FIS EFFECTIVE MODEL

Flood Study /Status FEMA FIS LIMITED DETAIL STUDY (Eff:6/18/2007, REV:7/17/2007) Non-Encroachment Established? YES

Flood Study 100yr. Discharge 6400 c.f.s. WS Elev.: With Non-Encroachment 104.25 ft. Without Non-Encroachment 103.59 @ Duplicate Effective STATION 348000 (U/S of BRIDGE)

DESIGN DATA

Hydrological Method USGS SIR 2009–5158 (REGION IV)

Hydraulic Design Method HEC–RAS VERSION 4.1.0 PROJECT NAME B4950 South River SR 1851

Floods Evaluated:

@ River Station 346534	Freq. (yr.)	Q (c.f.s)	Elev. (ft.)	Backwater (Rev. – Nat.) (ft.)	Bridge Opening Velocity (f.p.s.)
	10	4600	100.7	0.3	3.2
	25	6100	101.8	0.3	3.4
	50	7500	102.8	0.5	3.6
	100	8900	103.6	0.6	4.6
	100 FEMA	6400	103.31		3.3
	500	12000	105.0	0.7	5.7
	OVERTOPPING	9700	103.9		5.0

Waterway Opening Provided Below: Design W.S. Elev. 928 s.f., 100yr W.S. Elev. 1021 s.f., Total 1021 s.f.,

Average Channel Velocity (Design) 3.6 f.p.s. Average Overbank Velocity (Design) 1.2 f.p.s.

Computed 100–Yr Scour : General N/A ft. Contraction 2.2 ft. Local 5.6 ft.

Is a Floodway Revision Required? MOA 2A: MAX DECREASE = 0.12' @ RS 346629.3 & RS 348000

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, N. C.

I.D. No. B–4950 Project No. 40108.1.1 Proj. Station 18+27.50 –L–

County CUMBERLAND/SAMPSON Bridge Over SOUTH RIVER Bridge Inv. No. 172

On Highway SR 1851 FAIRCLOTH BRIDGE RD. Between SR 1848 BAINBRIDGE RD and SR 1424 SOUTH RIVER RD.

Recommended Structure 1@35' 21" CORED SLAB, 2@55' 24" CORED SLAB, 1@40' 21" CORED SLAB WITH 4' END BENT CAPS

Recommended Width of Roadway 30'–10" CLEAR RDY Skew 90°

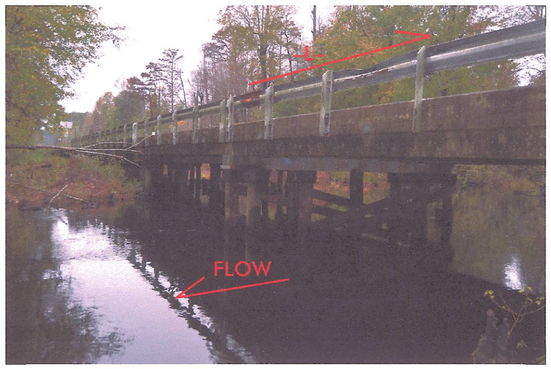
Recommended Location is (~~Up~~, (Af) ~~Down~~) Stream from Existing Crossing. EXISTING LOCATION

Statewide Tier ☐ Regional Tier ☐ Sub–Regional Tier ☒

Bench Mark is BM#1 – RAILROAD SPIKE IN BASE OF POPLAR 50' LT OF –BL– STA. 6+80.00

Elev. 104.14 ft. Datum: NAVD 1988

Temporary Crossing OFF–SITE DETOUR



Designed by: Rajender Gaddam

Assisted by: Alexander R Vinson

Project Engineer : Richard L Bollinger

Reviewed by: Craig A. Freeman Jr

Date 4/19/2016

RS&H

NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER JR.
DocSigned by: Richard Bollinger
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4/21/2016

Stream SOUTH RIVER Struc. Inv. No. 172 I.D. No. B-4950 Project No. 40108.1.1 PDF File 25_0172_2016_B4950_STA18+28_SOUTHRIVER_SR1851.PDF