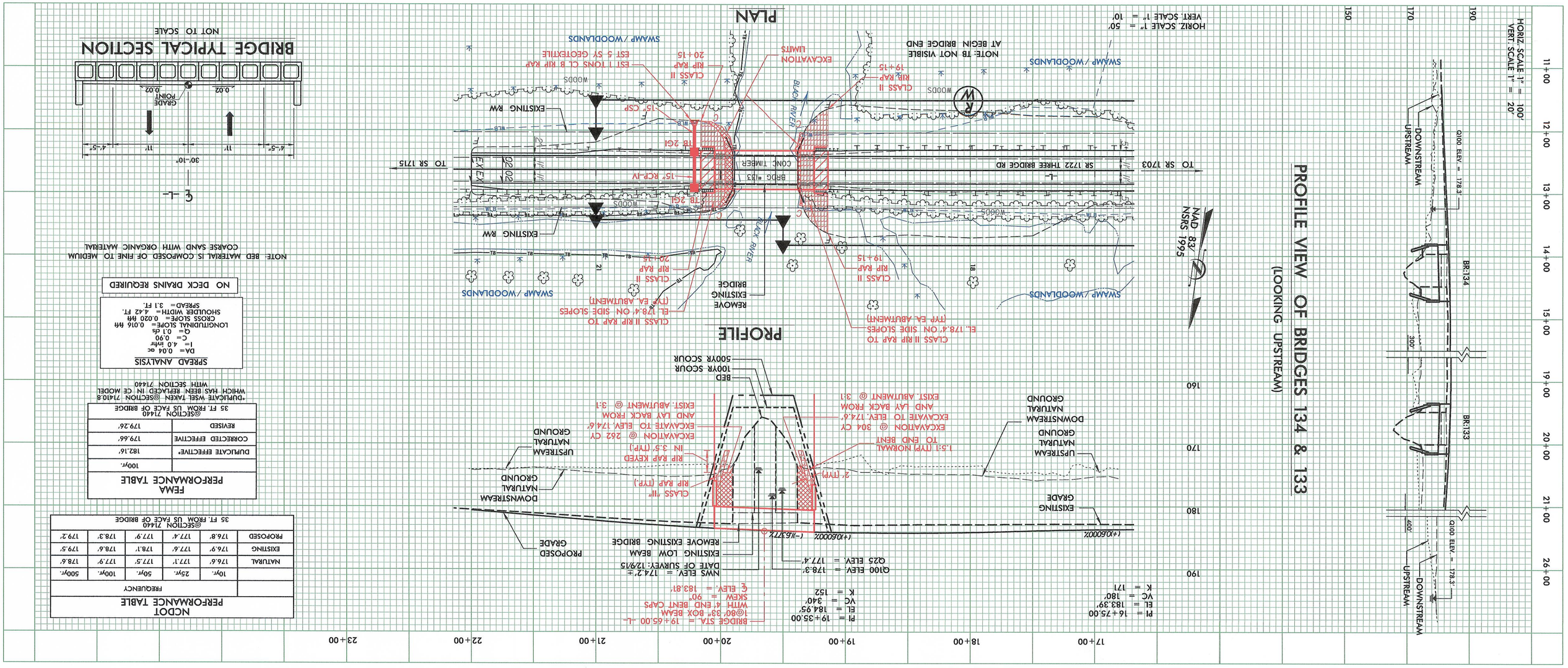


NOTE: BED MATERIAL IS COMPOSED OF FINE TO MEDIUM COARSE SAND WITH ORGANIC MATERIAL

NO DECK DRAINS REQUIRED

SPREAD ANALYSIS
DA= 0.04 ac
I= 4.0 in/hr
C= 0.90
Q= 0.1 cfs
LONGITUDINAL SLOPE= 0.016 ft/ft
CROSS SLOPE= 0.020 ft/ft
SHOULDER WIDTH= 4.42 FT.
SPREAD= 3.1 FT.

NCDOT PERFORMANCE TABLE

	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	176.6'	177.1'	177.5'	177.9'	178.6'
EXISTING	176.9'	177.6'	178.1'	178.6'	179.5'
PROPOSED	176.8'	177.4'	177.9'	178.3'	179.2'

@SECTION 71440
35 FT. FROM US FACE OF BRIDGE

FEMA PERFORMANCE TABLE

	100yr.
DUPLICATE EFFECTIVE*	182.16'
CORRECTED EFFECTIVE	179.66'
REVISED	179.26'

@SECTION 71440
35 FT. FROM US FACE OF BRIDGE

*DUPLICATE WSEL TAKEN @SECTION 71410.8 WHICH HAS BEEN REPLACED IN CE MODEL WITH SECTION 71440

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 71440

Design: Discharge 2200 c.f.s. Frequency 25 yr. Elev. 177.4 ft.

Base Flood: Discharge 3300 c.f.s. Frequency 100 yr. Elev. 178.3 ft.

Overtopping: Discharge 5575 c.f.s. Frequency 500+ yr. Elev. 179.2 ± * ft.

*ROADWAY OVERTOPPING ELEVATION.
ROADWAY OVERTOPS OUTSIDE OF PROFILE LIMITS
APPROXIMATELY 550' BACKSTATION OF STA 13+80

ADDITIONAL INFORMATION AND COMPUTATIONS

USGS SIR 2009-5158 (REGION IV) DRAINAGE AREA = 37.4 SQ. MI.

Q_{10} = 174 $(DA)^{0.617}$ = 174 $(37.4)^{0.617}$ = 1600 cfs

Q_{25} = 245 $(DA)^{0.606}$ = 245 $(37.4)^{0.606}$ = 2200 cfs

Q_{50} = 309 $(DA)^{0.600}$ = 309 $(37.4)^{0.600}$ = 2700 cfs

Q_{100} = 380 $(DA)^{0.594}$ = 380 $(37.4)^{0.594}$ = 3300 cfs

Q_{500} = 550 $(DA)^{0.583}$ = 550 $(37.4)^{0.583}$ = 4500 cfs

FEMA: Q100= 4604 cfs DA= 37.50 SQ.MI.

SCOUR COMPUTATIONS:

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

D50=2mm Dm=1.25*(D50)

100 YEAR CONTRACTION SCOUR: Yo=6.1'

Q=1900cfs Dm=0.0082' W=76.8' Ku=0.0077

$Y2=[(0.0077*1900^2)/(0.0082^{2/3}*76.8^{2\ 3/7})]$

Y2=7.6' Ys=7.6'-6.1' Ys=1.5'

500 YEAR CONTRACTION SCOUR: Yo=6.8'

Q=2681cfs Dm=0.0082' W=76.8' Ku=0.0077

$Y2=[(0.0077*2681^2)/(0.0082^{2/3}*76.8^{2\ 3/7})]$

Y2=10.3' Ys=10.3'-6.8' Ys=3.5'

*HISTORICAL DATA: MR.LEE HAS NEVER SEEN BRIDGE OVERTOP.

MR.PITTMAN: THE LOCAL BRIDGE SUPERVISOR (DIV 6) NOTES THAT THE HISTORICAL HIGH WATER ELEVATION IS THE BOTTOM OF THE JOISTS

THIS PROJECT COMPLIES WITH LOCAL FLOODPLAIN REGULATIONS.

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

SITE DATA

Drainage Area 37.4 SQ. MI. Source DELINEATED USGS STREAMSTATS & ArcGIS USGS TOPO BASEMAP

River Basin CAPE FEAR Character RURAL

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

Data on Existing Structure 1 SPAN @ 18', 1 SPAN @ 17', 1 SPAN @ 18'; RC DECK ON TIMBER JOISTS WITH TIMBER CAPS & PILES W/STEEL CRUTCH BENTS Total Waterway Opening 514 s.f.

Waterway Opening Below 100yr. WS EL. 371 s.f.

Debris Potential: Low ____ Moderate ____ High X

Data on Structures Up and Down Stream U/S: BR420017 SPANS: 1@51'1", 1@51'1", 1@51'1"; PPC CORED SLAB W/RC CAPS ON H.PILES; HEIGHT CROWN TO BED = 10' | D/S: BR 420131 SPANS: 1@28'9" 1@29', 1@28'9"; PPC CORED SLAB W/ PPC CAPS/H-PILES, CROWN TO BED = 12'

Design Control Elev. 178.6 ft. EXISTING Q100 WSEL @ RS 71440

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 SECTION

Date N/A Elev. N/A ft. Est. Freq. N/A yr. Source JAMES LEE (LOCAL RESIDENT) Period of Knowledge 5 yrs.

Date N/A Elev. 179.2' ± ft. Est. Freq. 500 yr. Source DARREN PITTMAN (DIVISION BRIDGE SUPERVISOR) Period of Knowledge 20+ yrs.

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

Channel Slope 0.00075 ft/ft Source USGS TOPO Normal Water Surface Elev. 174.2' ± ft.

Manning's n: Left O.B. .15 Channel .046 Right O.B. .15 Source EFFECTIVE MODEL & FIELD VISIT PHOTOS

Flood Study /Status FEMA FIS LIMITED DETAIL STUDY (EFF 10/3/2016; REV 7/17/2007) Non-Encroachment Established? YES

Flood Study 100yr. Discharge 4604 c.f.s. WS Elev.: With Non-Encroachment 182.15 ft. Without Non-Encroachment 182.16 ft. @ River Station 71411

DESIGN DATA

Hydrological Method USGS SIR 2009-5158 (REGION IV)

Hydraulic Design Method HEC-RAS VERSION 4.1.0 B4544 BLACK RIVER SR1722

Floods Evaluated: @ River Station 71440

Freq. (yr.)	Q (c.f.s.)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s.)
10	1600	176.8	0.2	2.6
25	2200	177.4	0.3	3.2
50	2700	177.9	0.4	3.6
100	3300	178.3	0.4	4.0
100 FEMA	4604	179.26	-	5.3
500	4500	179.2	0.6	5.1
OT	5575	179.8	0.7	5.7

Waterway Opening Provided Below: Design W.S. Elev. 409 s.f., 100yr W.S. Elev. 470 s.f., Total 645 s.f.,

Average Channel Velocity (Design) 2.3 f.p.s. Average Overbank Velocity (Design) 0.9 f.p.s.

Computed Scour : General N/A ft. Contraction 100YR: 1.5' 500YR: 3.5' ft. Local N/A ft.

Is a Floodway Revision Required? MOA TYPE 2A; MAX DECREASE 0.40' @ RS 71440

Stream BLACK RIVER Struc. Inv. No. 133_I.D. No. B-4544 Project No.38406.1.2 PDF File 42_133_2016_B4544_STA19+65.00_BLACKRIVER_SR1722

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

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

I.D. No. B-4544 Project No. 38406.1.2 Proj. Station 19+65.00 -L-

County HARNETT Bridge Over BLACK RIVER Bridge Inv. No. 133

On Highway SR 1722 THREE BRIDGE RD Between SR 1703 RED HILL CHURCH RD and SR 1715 MEADOWLARK RD

Recommended Structure 1@80'; 33" BOX BEAM WITH 4' END BENT CAPS

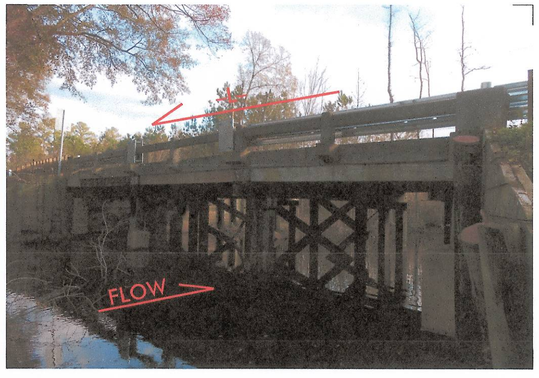
Recommended Width of Roadway 30'-10" CLEAR RDY Skew 90°

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

Statewide Tier ☐ Regional Tier ☐ Sub-Regional Tier ☒

Bench Mark is BM#1 - RAILROAD SPIKE IN 13" PINE 115' EAST AND 113' NORTH OF -L- STA. 10+00 Elev. 178.35 ft. Datum: NAVD 88

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 9/13/2016

RS&H

NORTH CAROLINA PROFESSIONAL SEAL 18442 ENGINEER RICHARD LEON BOLLINGER, JR.

9/13/2016