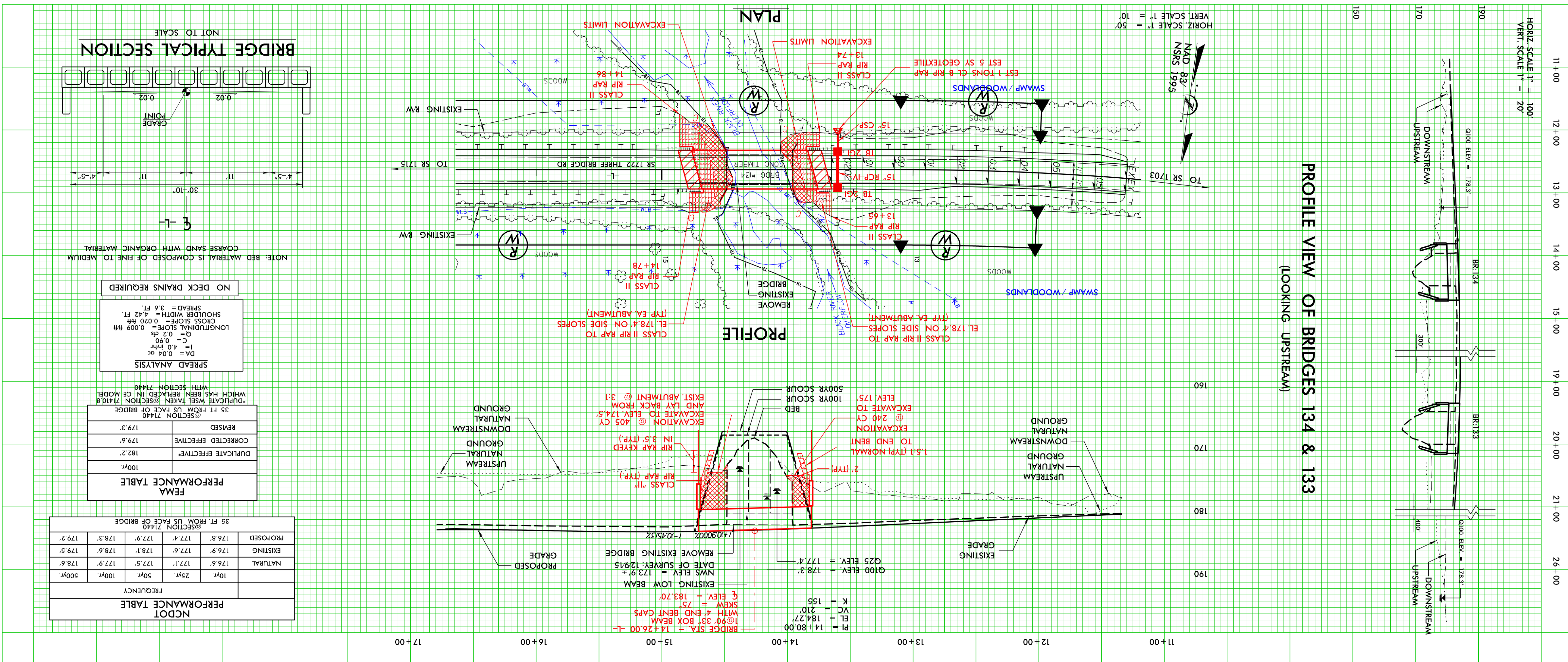




Design:	Discharge	<u>2200</u>	c.f.s.	Frequency	<u>25</u>	yr.	Elev.	<u>177.4</u>	ft.
Base Flood:	Discharge	<u>3300</u>	c.f.s.	Frequency	<u>100</u>	yr.	Elev.	<u>178.3</u>	ft.
Overtopping:	Discharge	<u>5575</u>	c.f.s.	Frequency	<u>500+</u>	yr.	Elev.	<u>179.2 ± *</u>	ft.

USGS SIR 2009-5158 (REGION IV)		DRAINAGE AREA = 37.4 SQ. MI.	
Q ₀ = 174 (DA)	^{0.617} = 174 (37.4)	^{0.617} = 1600 cfs	
Q ₁₅ = 245 (DA)	^{0.606} = 245 (37.4)	^{0.606} = 2200 cfs	
Q ₃₀ = 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.			

CLEAR WATER CONTRACTION SCOUR: $Y_2 = \left[\left(K_u Q^2 \right) / \left(D_m^{2.3} \cdot W \right) \right]$ $Y_s = Y_2 - Y_o$ $D50 = 2\text{mm}$ $D_m = 1.25 \cdot (D50)$	
100 YEAR CONTRACTION SCOUR: $Y_o = 4.9'$ $Q = 1400\text{cfs}$ $D_m = 0.0082'$ $W = 86.8'$ $K_u = 0.0077$ $Y_2 = \left[\left(0.0077 \cdot 1400^2 \right) / \left(0.0082^{2.3} \cdot 86.8 \right) \right]$ $Y_2 = 5.3'$ $Y_s = 5.3' - 4.9'$ $Y_s = 0.4'$	500 YEAR CONTRACTION SCOUR: $Y_o = 5.6'$ $Q = 1819\text{cfs}$ $D_m = 0.0082'$ $W = 86.8'$ $K_u = 0.0077$ $Y_2 = \left[\left(0.0077 \cdot 1819^2 \right) / \left(0.0082^{2.3} \cdot 86.8 \right) \right]$ $Y_2 = 6.6'$ $Y_s = 6.6' - 5.6'$ $Y_s = 1.0'$

*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.

Drainage Area 37.4 SQ. MI. Source DERIVED 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 @ 18'3", 1 SPAN @ 17', 1 SPAN @ 18'3"; RC DECK ON TIMBER JOISTS WITH TIMBER CAPS & PILES W/CRUTCH BENTS Total Waterway Opening 431 s.f.

Waterway Opening Below 100yr. WS EL. 284 s.f.

Debris Potential: Low Moderate High X

Data on Structures Up and Down Stream US: 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' | DS: 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 _____ yrs.

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

JAMES LEE
(LOCAL RESIDENT)

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

DARREN PITTMAN
(DIVISION BRIDGE SUPERVISOR)

Date N/A Elev. 179.2' ± ft. Est. Freq. 500 yr. Source (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.	173.9 ±	ft.
Manning's n: Left O.B.	.15	Channel	.046	Right O.B.	.15	Source	EFFECTIVE MODEL & FIELD VISIT PHOTOS
FEMA FIS LIMITED DETAIL STUDY							
Flood Study/Status	(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
DESIGN DATA @				River Station	71411		

Hydrological Method <u>USGS SIR 2009-5158 (REGION IV)</u>						
Hydraulic Design Method <u>HEC-RAS VERSION 4.1.0 B4544 BLACK RIVER SR1722</u>						
Floods Evaluated:	Freq. (yr.)	Q (c.f.s)	Elev. (ft.)	Backwater	Bridge Opening (f.p.s.)	Velocity
River Station 71440	10	1600	176.8	0.2	2.1	
	25	2200	177.4	0.3	2.6	
	50	2700	177.9	0.4	2.9	
	100	3300	178.3	0.4	3.3	
	100 FEMA	4604	179.3	-	3.7	
	500	4500	179.2	0.6	3.7	
	OT	5575	179.8	0.7	4.2	

Waterway Opening Provided Below: Design W.S. Elev. 354 s.f., 100yr W.S. Elev. 424 s.f., Total 609 s.f.,
Average Channel Velocity (Design) 2.3 f.p.s. Average Overbank Velocity (Design) 0.9 f.p.s.
100YR: 0.4'
500YR: 1.0'
Computed Scour : General N/A ft. Contraction 100YR: 0.4' ft. Local N/A ft.
Is a Floodway Revision Required? MOA TYPE 2A; MAX DECREASE 0.3' @ RS 71440

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

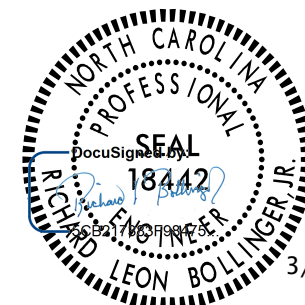
I.D. No. B-4544 Project No. 38406.1.2 Proj. Station 14 + 26.00 -L-
 County HARNETT Bridge Over BLACK RIVER OVERFLOW Bridge Inv. No. 134
 On Highway SR 1722 THREE BRIDGE RD Between SR 1703 RED HILL CHURCH RD and SR 1715 MEADOWLARK RD
 Recommended Structure 1@90'; 33" BOX BEAM WITH 4' END BENT CAPS
 Recommended Width of Roadway 30'-10" CLEAR RDY Skew 75°
 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 Date 3/22/2017
Assisted by: Alexander R Vinson
Project Engineer : Richard L Bollinger
Reviewed by: _____

RS&H

Stream
BLACK RIVER
OVERFLOW



3/22/2013