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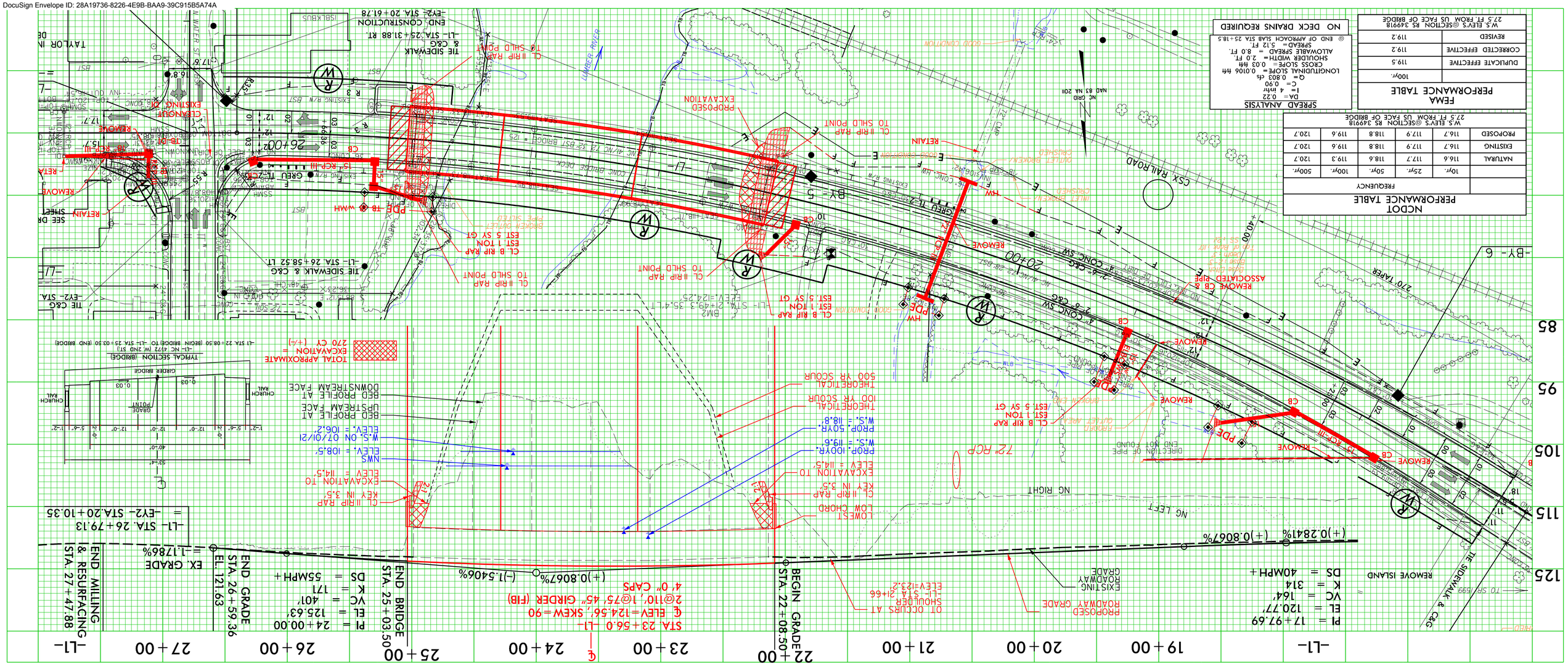


INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 349918

Design:	Discharge	13,700	c.f.s.	Frequency	50 yr.	Elev.	118.8 ft.
Base Flood:	Discharge	15,900	c.f.s.	Frequency	100 yr.	Elev.	119.6 ft.
Overtopping:	Discharge	21,100+	c.f.s.	Frequency	500+ yr.	Elev.	123.2* ft.

*OT OCCURS AT SHOULDER -L1- STA 21+66 ±, ELEV=123.2'

ADDITIONAL INFORMATION AND COMPUTATIONS

HYDROLOGY:

USGS RURAL REGRESSION REPORT 2009-5158 **
DA=714 SQ. MI., REGION 3 (45.3%), REGION 4 (54.7%)

Q10= 8,850 cfs
Q25= 11,500 cfs
Q50= 13,700 cfs
Q100= 15,900 cfs
Q500= 21,100 cfs

FEMA MODEL DISCHARGES:*
D.A.=725.6 SQ. MI.
Q10= 8,150 cfs
Q25= 10,700 cfs
Q50= 12,800 cfs
Q100= 14,900 cfs
Q500= 20,200 cfs

* NOTE: FEMA DISCHARGES USED FOR COMPLIANCE
** NOTE: USGS DISCHARGES USED FOR DESIGN

GAGE 02134170 COULD NOT BE USED WITH THE GAGED LOCATION WEIGHTED METHODOLOGY OR UNGAGED NEAR GAGED LOCATION METHODOLOGY SINCE THE GAGE IS NOT PART OF THE SIR 2009-5158 METHODOLOGY.

SCOUR

HEC-18, REV. 2012; computations by hand using HEC-RAS ver. 4.1.0 values

CONTRACTION SCOUR (100 YR)

(Live Bed Equations Used):

$Y_2 = Y_1 \left[\left(\frac{Q_2}{Q_1} \right)^{6/7} \left(\frac{w_1}{w_2} \right)^{K} \right]$ & $Y_S = Y_2 - Y_0$

$Y_1 = 18.2'$ $K_1 = 0.69$

$Q_1 = 13133$ cfs $Q_2 = 12668$ cfs

$w_1 = 297.9'$ $w_2 = 291.8'$

$Y_0 = 12.1'$ $Y_S = 5.8'$ CHANNEL

CONTRACTION SCOUR (500 YR)

(Live Bed Equations Used):

$Y_2 = Y_1 \left[\left(\frac{Q_2}{Q_1} \right)^{6/7} \left(\frac{w_1}{w_2} \right)^{K} \right]$ & $Y_S = Y_2 - Y_0$

$Y_1 = 19.4'$ $K_1 = 0.69$

$Q_1 = 17101$ cfs $Q_2 = 16791$ cfs

$w_1 = 303.8'$ $w_2 = 291.8'$

$Y_0 = 12.1'$ $Y_S = 7.6'$ CHANNEL

LOCAL SCOUR (100 YR)

$Ys_{Pier} = Y_1 \left[(2.0)(K_1)(K_2)(K_3)(a/Y_1)^{0.65} (Fr_1)^{0.43} \right]$

$Ys_{Pier} = 17.0 \left[(2.0)(1.0)(1.0)(1.1)(3.5/17.0)^{0.65} (0.26)^{0.43} \right] =$ 7.5'

LOCAL SCOUR (500 YR)

$Ys_{Pier} = Y_1 \left[(2.0)(K_1)(K_2)(K_3)(a/Y_1)^{0.65} (Fr_1)^{0.43} \right]$

$Ys_{Pier} = 18.1 \left[(2.0)(1.0)(1.0)(1.1)(3.5/18.1)^{0.65} (0.31)^{0.43} \right] =$ 8.3'

SITE DATA

Drainage Area 714 SQ. MI. Source USGS QUAD: SOUTHWEST LUMBERTON/STREAMSTATS

River Basin LUMBER Character RESIDENTIAL, WOODED

Stream Classification (Such as Trout, High Quality Water, etc.) CL C; SW; NC NATURAL & SCENIC RIVERS

Data on Existing Structure 6@47'6" RC DECK ON CONC. GIRDERS

E.BTS & INT.BTS: RC CAP/PPC PILES Total Waterway Opening 3431 s.f.
Waterway Opening Below 100yr. WS EL. 3428 s.f.

Debris Potential: Low ..... Moderate X High .....

Data on Structures Up and Down Stream

UPSTREAM: BR #770175 (OAL=267.75') ON SR 1600

DOWNSTREAM: RAILROAD BRIDGE (OAL=352')

Design Control Elev. MAINTAIN OR IMPROVE EXISTING L.O.S

Gage Station No. 02134170 Period of Records 2000-2021 yrs.

Max. Discharge 17,100 c.f.s. Date SEP. 2018 HURRICANE FLORENCE Frequency 100 YR +

Historical Flood Information:

Date SEP. 2018 Elev. NO OT 119.7' ft. Est. Freq. 100+ yr. Source 02134170 GAGE PEAK STREAMFLOW Period of Knowledge 21 yrs.

Date NO OVERTOPPING Elev. ..... ft. Est. Freq. 100+ yr. Source BRANDON LOVE FLOODPLAIN ADMINISTRATOR Period of Knowledge 20 yrs.

Date ..... Elev. ..... ft. Est. Freq. ..... yr. Source ..... Period of Knowledge ..... yrs.

Historical Scour Info. : General — ft. Contraction — ft. Local — ft.

Channel Slope 0.003 ft/ft Source USGS QUAD Normal Water Surface Elev. 108.5 ft.

Manning's n: Left O.B. 0.032-0.15 Channel 0.035-0.065 Right O.B. 0.032-0.15 Source FIELD OBSERVATION/FIS

Flood Study/Status DETAILED STUDY DATE 12/6/2019 FIRM PANEL #9391 DATE 12/6/2019 Floodway Established? YES

Flood Study 100yr. Discharge 14900 c.f.s. WS Elev.: With Floodway 119.8 ft. Without Floodway 119.5 ft.
@ River Station 349918

DESIGN DATA

Hydrological Method USGS RURAL REGRESSION REPORT SIR 2009-5158

Hydraulic Design Method HEC-RAS VER. 4.1.0 PROJ. TITLE: B-5985_LUMBER_RIVER_SR1600_NC41_NC72.PRJ

Floods Evaluated:

@ River Station 349918	Freq. (yr.)	Q (c.f.s)	Elev. (ft.)	Backwater (ft.)	Bridge Opening	Velocity (f.p.s.)
	10	8,850	116.7	0.1		2.9
	25	11,500	117.9	0.2		3.4
	(DESIGN) 50	13,700	118.8	0.2		3.9
	100	15,900	119.6	0.3		4.5
	500	21,100	120.7	0.0		6.0

Waterway Opening Provided Below: Design W.S. Elev. 3525 s.f., 100yr W.S. Elev. 3525 s.f., Total 3525 s.f.,

Average Channel Velocity (Design) 5.5 f.p.s. Average Overbank Velocity (Design) 0.8 f.p.s.

Computed Scour : General — ft. Contraction 100 YR - 5.8 500 YR - 7.6 ft. Local 100 YR - 7.5 500 YR - 8.3 ft.

Is a Floodway Revision Required? MOA TYPE 1 (0.1' MAX DECREASE AT HEC-RAS SECTION 354165)

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

RALEIGH, N. C.

I.D. No. B-5985 Project No. 47749.1.1 Proj. Station 23+56 -L1-

County ROBESON Bridge Over LUMBER RIVER Bridge Inv. No. 0125

On Highway NC 41/NC 72 Between APPLE ST (SR 1599) and N WATER ST (SR 1536)

Recommended Structure 2@110', 1@75' 45" GIRDER (FIB)
4'-0" DEEP CAP

Recommended Width of Roadway 40'-0" CLEAR BRIDGE WIDTH, 53'-4" OUT-TO-OUT Skew 90°

Recommended Location is ~~(Up, At, Down)~~ Stream from Existing Crossing AT

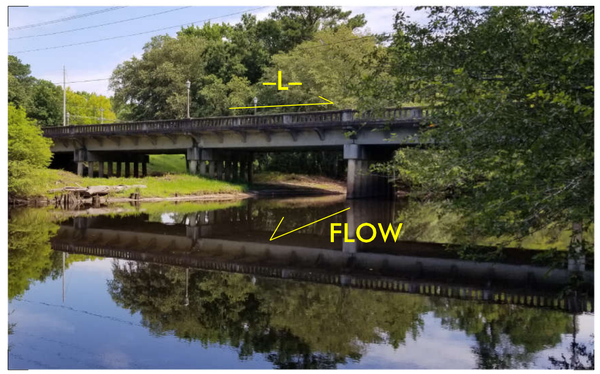
Latitude 34.61803 Longitude -79.01127

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM-2 (RR SPIKE IN BASE OF 10" PEAR) 35.43' LT OF -L1- STA 21+49.34

Northing 316000 Easting 1996394 Elev. 124.25 ft. Datum: NAVD 88

Temporary Crossing OFF-SITE DETOUR



Designed by: HARMINDER SINGH, PE — WETHERILL ENGINEERING

Assisted by: FORREST BROOKS, EI

Project Engineer : KEVIN ALFORD, PE

Reviewed by:

Date 9/14/2021

NORTH CAROLINA PROFESSIONAL SEAL 044561 ENGINEER HARMINDER SINGH

Stream LUMBER RIVER Struc. Inv. No. 0125 I.D. No. B-5985 Project No. 47749.1.1 PDF File 770125_2021_B-5985_LUMBER_RIVER_SR_1600_NC_41_NC72.PDF