



NO DECK DRAINS REQUIRED

SPREAD ANALYSIS
 DA = 0.046
 C = 7
 Q = 0.17
 LONGITUDINAL SLOPE = 0.02 H/H
 CROSS SLOPE = 4.5"
 SHOULDER WIDTH = 4.5'
 SPREAD = 4.5 FT.

FEMA PERFORMANCE TABLE

60 FT. FROM US FACE OF BRIDGE	100yr.	50yr.	100yr.
PROPOSED	718.7	718.3	719.6
EXISTING	717.6	718.3	719.5
NATURAL	714.1	714.8	716.9

FEMA SECT 434113

NC DOT PERFORMANCE TABLE

60 FT. FROM US FACE OF BRIDGE	100yr.	25yr.	100yr.	500yr.
PROPOSED	718.7	717.7	718.7	719.6
EXISTING	717.6	718.3	718.9	719.5
NATURAL	714.1	714.8	715.8	716.9

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 434119

Design:	Discharge	4700	c.f.s.	Frequency	25	yr.	Elev.	717.7	ft.
Base Flood:	Discharge	6500	c.f.s.	Frequency	100	yr.	Elev.	718.7	ft.
Overtopping:	Discharge	4700	c.f.s.	Frequency	25	yr.	Elev.	717.4	ft.

SAG AT STA 17+25

ADDITIONAL INFORMATION AND COMPUTATIONS

DA = 36.1 SQ. MI. RURAL

USGS SIR 2009 5158 FEMA

Q ₁₀	= 3640 = 3600 CFS	Q ₁₀	= 2200 CFS
Q ₂₅	= 4720 = 4700 CFS	Q ₅₀	= 4600 CFS
Q ₅₀	= 5680 = 5700 CFS	Q ₁₀₀	= 6100 CFS
Q ₁₀₀	= 6530 = 6500 CFS	Q ₅₀₀	= 11,500 CFS
Q ₅₀₀	= 8670 = 8700 CFS		

USE USGS

CONTRACTION SCOUR = 25-YEAR

Y_s = Y₂ - Y₀ Y₀ = 717.6 - 705.1 = 12.5

Y₂ = Y₁ (Q₂/Q₁)^{0.67} (W₁/W₂)^{0.64} = 12.5 (4010/1312)^{0.67} (32/33)^{0.64} = 31.9

Y_s = 31.9 - 12.5 = 19.4

COMPLIES WITH LOCAL FLOODPLAIN REGULATIONS

SITE DATA

Drainage Area 36.1 SQ. MI. Source AND USGS QUAD

River Basin CAPE FEAR Character RURAL

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

Data on Existing Structure ..1@17', 1@40', 1@17' STEEL I-BEAM ON TIMBER DECK, TIMBER VERT. ABUTMENTS

..... Total Waterway Opening 324 s.f.

..... Waterway Opening Below 100yr. WS EL. 324 s.f.

Debris Potential: Low ..X.. Moderate High

Data on Structures Up and Down Stream UPSTREAM: SR 2351, BRG #17, 3@40' STEEL I-BEAM

..... DOWNSTREAM: SR 1001, 3@40' CORED SLAB

MATCH OR REDUCE CORRECTED EFFECTIVE 100 YR = 718.88

Design Control Elev. ft.

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

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

Historical Flood Information:

Date	9-96	Elev.	715	ft.	Est. Freq.	yr.	Source	JUDY MILLER - RESIDENT	Period of Knowledge	38	yrs.
Date		Elev.		ft.	Est. Freq.	yr.	Source		Period of Knowledge		yrs.
Date		Elev.		ft.	Est. Freq.	yr.	Source		Period of Knowledge		yrs.

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

Channel Slope 0.001 ft/ft Source USGS QUAD Normal Water Surface Elev. 707.4 ft.

Manning's n: Left O.B. 0.12 Channel 0.065 Right O.B. 0.12 Source FIELD RECON. AND FEMA DETAILED STUDY (REDELINATED)

Flood Study /Status EFFECTIVE DATE 7-3-07 Floodway Established? YES

Flood Study 100yr. Discharge 6100 c.f.s. WS Elev.: Floodway 725.4 ft. Floodway 724.9 ft.

@ River Station 443926

DESIGN DATA

Hydrological Method USGS REGRESSION SIR 2009 5158

Hydraulic Design Method HEC RAS 4.1 (B-4802 HAW RIVER SR 1002)

Floods Evaluated:	Freq. (yr.)	Q (c.f.s.)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s.)
@ River Station 434119	10	3600	715.8	1.7	7.9
	25	4700	717.7	2.8	10.3
	100	6500	718.7	2.9	11.4
	500	8700	719.6	2.6	11.0
FEMA 100		6100	718.6		

Waterway Opening Provided Below Design W.S. Elev. 456 s.f. 100yr W.S. Elev. 456 s.f. Total 451 s.f.

Average Channel Velocity (Design) 2.8 f.p.s. Average Overbank Velocity (Design) 1.0 f.p.s.

Computed Scour : General NONE ft. Contraction 19.4 ft. Local ft.

Is a Floodway Revision Required? NO, MOA 2a

FEMA DETAILED STUDY (REDELINATED)
 CAPE FEAR RIVER BASIN

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

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

I.D. No. B-4802 Project No. 38572.1.1 Proj. Station 19+90 -L-.....

County ROCKINGHAM Bridge Over HAW RIVER Bridge Inv. No. 18

SR 1002 SR 2305 SR 1001

On Highway (SCALESVILLE RD) Between (WITTY RD) and (CHURCH ST. EXT)

Recommended Structure 1@100' 39" BOX BEAM WITH 4' END BENT CAPS

Recommended Width of Roadway 30'-10" F-E Skew 60°

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

Statewide Tier Regional Tier Sub-Regional Tier

Bench Mark is BM #2: RR SPIKE IN BASE OF 28" POPLAR, 21+33 -L-, 84' RT

Elev. 718.09 ft. Datum: NAVD 88

Temporary Crossing OFF-SITE

Stream HAW RIVER Struct. Inv. No. 18 I.D. No. B-4802 Project No. 38572.1.1 PDF File 760018.2016.B-4802.SR.1002.HAW.RIVER

Designed by: SUNGATE DESIGN GROUP, PA Date

Assisted by: BN ELAM, WT PERRY, JR HARVEY

Project Engineer: W HENRY WELLS, JR, P.E.

Reviewed by: 4/5/2017

SUNGATE DESIGN GROUP, PA
 915 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27609
 NC COA No. C-0890

4/3/2017