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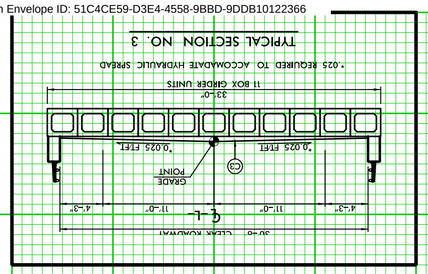

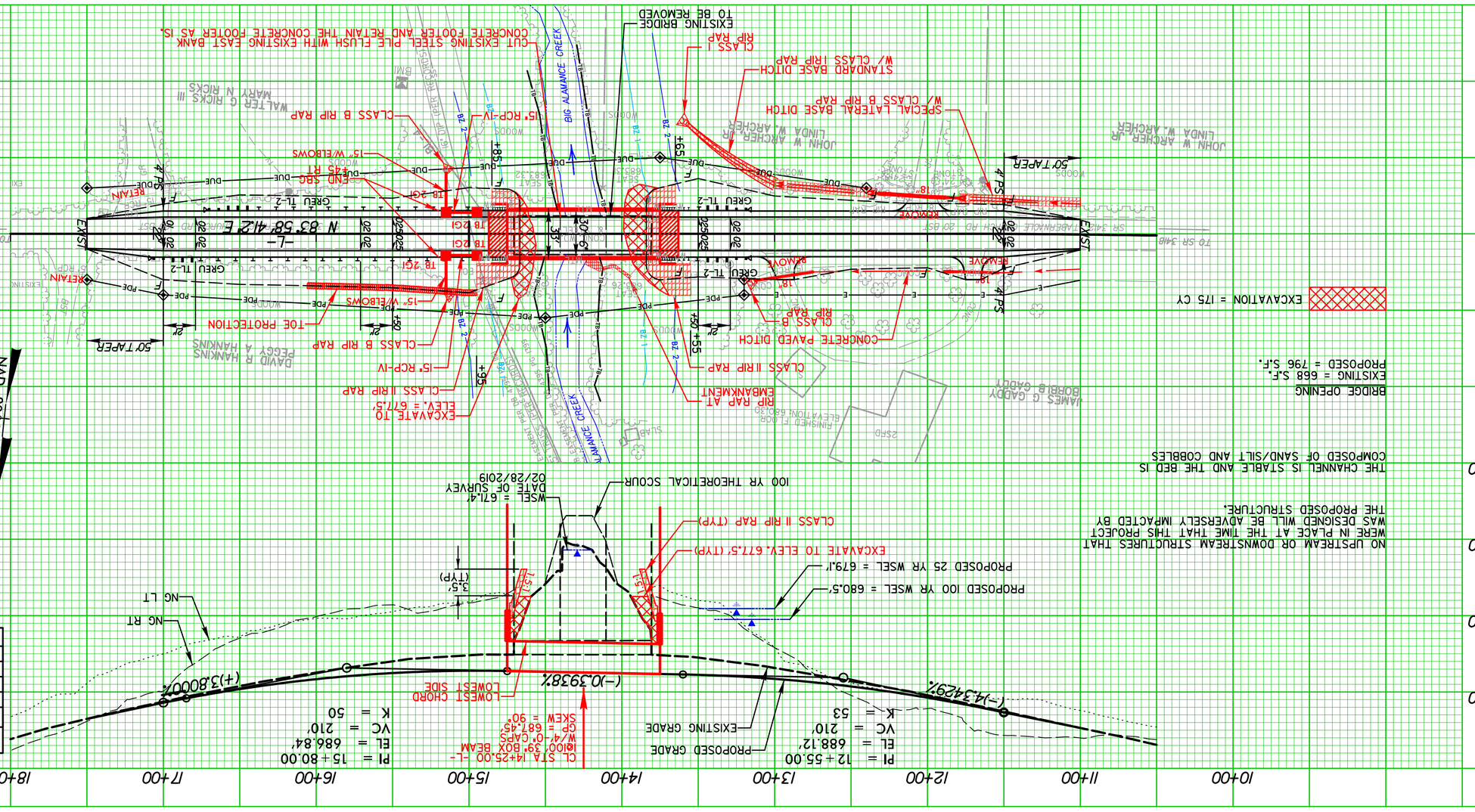

NO DECK DRAINS REQUIRED

SPREAD ANALYSIS @ BOX

Q= 0.20 cfs
LONGITUDINAL SLOPE= 0.003 ft/ft
CROSS SLOPE= 0.025 ft/ft
SHOULDER WIDTH= 4.25 Ft.
SPREAD= 4.2 FT.

SPREAD ANALYSIS @ EOB

DA= 0.042 ac
I= 4.0 in/hr
Q= 0.15 cfs
C= 0.9
LONGITUDINAL SLOPE= 0.0039 ft/ft
CROSS SLOPE= 0.025 ft/ft
SHOULDER WIDTH= 4.25 Ft.
SPREAD= 3.6 FT.

FEMA PERFORMANCE TABLE

	100yr.
DE - 182208	681.5'
CORRECTED EFFECTIVE	680.6'
REVISED	680.5'

@SECTION 182177
25.5 Ft. FROM US FACE OF BRIDGE

NCDOT PERFORMANCE TABLE

	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	678.0'	679.0'	679.7'	680.2'	681.5'
EXISTING	678.2'	679.2'	680.0'	680.6'	682.0'
PROPOSED	678.2'	679.1'	679.9'	680.5'	681.9'

@SECTION 182177 25.5 FT. FROM US FACE OF BRIDGE

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 182177

Design:	Discharge	1494	c.f.s.	Frequency 25 yr.	Elev.	679.1 ft.
Base Flood:	Discharge	2116	c.f.s.	Frequency 100 yr.	Elev.	680.5 ft.
Overtopping:	Discharge	6666	c.f.s.	Frequency 500+ yr.	Elev.	*687.2 ft.

*OT OCCURS AT SAG AT STA 14+95 -L-

ADDITIONAL INFORMATION AND COMPUTATIONS

HYDROLOGY

DRAINAGE AREA = 4.71 SQ. MI. - REGION J

RURAL RIDGE and VALLEY-PIEDMONT
SIR 2009-5158

		SAY	FEMA
Q_{10} =	398 (4.71)$^{0.617}$ = 1035	1000 CFS	1128 CFS
Q_{25} =	537 (4.71)$^{0.606}$ = 1373	1400 CFS	1494 CFS
Q_{50} =	661 (4.71)$^{0.600}$ = 1675	1700 CFS	1819 CFS
Q_{100} =	776 (4.71)$^{0.594}$ = 1948	2000 CFS	2116 CFS
Q_{500} =	1,072 (4.71)$^{0.583}$ = 2646	2600 CFS	2867 CFS

FEMA 100 YR DISCHARGE USED FOR NCFMP COMPLIANCE AND DESIGN

DESIGN FOLLOWS SUB-REGIONAL TIER GUIDELINES

CONTRACTION SCOUR:

$Y_2 = Y_1 [Q_2/Q_1]^{K_1} [W_1/W_2]^{K_2}$

$Ys = Y_2 - Yo$

100 YR SCOUR CALCULATIONS

QI= 1500.4 CFS (SEC 182208) Q2= 1844.2 (SEC 182128 BR U) KI= 0.69

WI= 33.5 FT (SEC 182208) W2= 36.2 FT (SEC 182128 BR U)

YI= 9.8 FT (SEC 182208) Yo= 7.6 FT (SEC 182128 BR U)

Ys= 11.1' - 7.6' = 3.5 FT

SITE DATA

Drainage Area 4.71 SQ. MI. Source USGS STREAMSTATS

River Basin CAPE FEAR Character RURAL - REGION I

Stream Classification (Such as Trout, High Quality Water, etc.) WS-IV, NSW

Data on Existing Structure 3@30' PCPS CONC. CHANNELS, EBTS: PPC CAP & TIMBER PILES, INTBTS: PPC CAP & STEEL PILES, ALL CONC. ENCASED Total Waterway Opening 668 s.f.
Waterway Opening Below 100yr. WS EL. 397 s.f.

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

Data on Structures Up and Down Stream US - SR 3413 - 2 @ 72" CMP

DS - 400016 - SR 3411 - 1@31'2", 1@30'1", 1@31'2" PCPS CONC. CORED SLAB, END & INTERIOR BENTS: PPC CAPS ON STEEL PILES

Design Control Elev. MAINTAIN OR IMPROVE EXISTING LEVEL OF SERVICE ft.

Gage Station No. NONE Period of Records N/A yrs.

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

Historical Flood Information:

Date ..... Elev. NEVER OVER ROAD ft. Est. Freq. ..... yr. Source BILL ARCHER (LOCAL RESIDENT) Period of Knowledge 41 yrs.

Date ..... Elev. NEVER OVER ROAD ft. Est. Freq. ..... yr. Source MARLIN HOGLEN (LOCAL RESIDENT) Period of Knowledge 21 yrs.

Date ..... Elev. NEVER OVER ROAD ft. Est. Freq. ..... yr. Source JIM GADDY (LOCAL RESIDENT) Period of Knowledge 40 yrs.

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

Channel Slope 0.0042 ft/ft Source USGS QUAD Normal Water Surface Elev. 671.4 ft.

Manning's n: Left O.B. US: 0.12 DS: 0.13 Channel US: 0.045 DS: 0.042 Right O.B. US: 0.12 DS: 0.13 Source FEMA/FIELD RECON

Flood Study /Status DETAILED STUDY EFF: 11/17/2017 REV: 11/17/2017 Floodway Established? YES

Flood Study 100yr. Discharge 2116 c.f.s. WS Elev.: Floodway With 681.8 ft. Floodway Without 681.5 ft. @ River Station 182208

DESIGN DATA

Hydrological Method USGS RURAL REGRESSION - REGION J

Hydraulic Design Method HEC-RAS V 4.1.0

Floods Evaluated:	Freq. (yr.)	Q (c.f.s)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s.)
@ River Station 182177	10	1128	678.2	0.2	4.3
	25	1494	679.1	0.1	4.5
	50	1819	679.9	0.2	4.6
	100	2116	680.5	0.3	4.8
	500	2867	681.9	0.4	5.1

Waterway Opening Provided Below: Design W.S. Elev. 335 s.f., 100yr W.S. Elev. 443 s.f., Total 796 s.f.,

Average Channel Velocity (Design) 4.1 f.p.s. Average Overbank Velocity (Design) 0.8 f.p.s.

Computed Scour : General N/A ft. Contraction 3.5 ft. Local N/A ft.

Is a Floodway Revision Required? NO, MEETS MOA TYPE 1
MAX DECREASE OF 0.1' AT RS 182473, RS 182330, RS 182208, AND RS 182177

DETAILED STUDY

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

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

DS GL

I.D. No. SF-400584 Project No. 17BP.7.R.138 Proj. Station 14+25.00 -L-

County GUILFORD Bridge Over BIG ALAMANCE CREEK Bridge Inv. No. 0584
On Highway SR 3412 (TABERNACLE CHURCH ROAD) Between SR 3418 (NEELLEY ROAD) and SR 3411 (HAGAN STONE PARK ROAD)

Recommended Structure @100' 39" BOX BEAM W/4'-0" CAPS

Recommended Width of Roadway 30'-6" CLEAR ROADWAY Skew 90°

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

Latitude 35.96268 Longitude -79.7515

Statewide Tier ☐ Regional Tier ☐ Sub-Regional Tier ☒

Bench Mark is BM#1 - BENCH NAIL SET IN 18" OAK 100' RT OF -L- STA 15+44

Northing 805983 Easting 1788500 Elev. 678.49 ft. Datum: NAVD 88

Temporary Crossing IS NOT REQUIRED - OFF SITE DETOUR

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

Designed by:

Assisted by: DGL, EAB Date

Project Engineer : REID B. ROBOL, PE

Reviewed by: DocuSigned by: Erik Sates 914DF6C33CF245D...

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043870 REID B. ROBOL

DocuSigned by: Reid B. Robol 1E3E5429E6B4...

7/1/2019

BIG ALAMANCE CREEK Stream Struc. Inv. No. 0584 I.D. No. SF-400584 Project No. 17BP.7.R.138 File: BIGALAMANCECREEK_SR3412.PDF 400584_2019_SF400584