

Hydraulics Unit Pre-Design Report (Pre-Scoping) for Structure #: 230077

Date: 04/20/2017

County: Columbus Stream: Big Creek *as stated by FRIS*
Road #: NC214 Road Name: Sam Potts Hwy
Division: 6 Location: 0.8 M.I.E. JCT. SR1757
Latitude: 34.32193 Longitude: 78.46752 Decimal degrees, a min of 5 decimal points

Assigned to:
Prepared By: HAM
Hydro Mgr: Hydro Reviewer:
Project Type:

Existing Structure

Structure Type: Bridge Yr Built: 1922
Span Arrangement: 8@24.5' OAL (ft): 196.0 Skew: 90 Abutment Type: Vertical-Concrete
Number of Barrels: @ Span (ft): x Rise (ft):
Bed to Crown (ft): 12.0 Clear Roadway (ft): 33.8 Water Depth (ft): 2.0 Superstructure Depth: 3.4'
ADT: 2000 Year ADT: 2013 Scour Code (item113): 8 Prior Survey Completed: Survey Date:
Drainage Area: 68.9 Sq. Mi. Drainage Area Source: USGS Stream Stats Roadway Overtops at Q100: ☐
Discharge Method: USGS Regression Equations USGS Region: 4- Coastal Stream Gage Number(if applicable):
Q10 (cfs): 2,400 Q25 (cfs): 3,200 Q50 (cfs): 4,000 Q100 (cfs): 4,700 QBFE (cfs):
☒ Structure in Flood Hazard Zone Panel #: 1260 Panel Date: 06/02/2006 Type of FIS: DETAILED Date of FIS: 06/02/2006

Enviromental

Quad Map: LAKE WACCAMAW EAST, NC River Basin: Lumbar Buffer Rule: NA
Primary Stream Classification
☐ Class B ☒ Class C ☐ SA ☐ SB
☐ SC ☐ SWL ☐ WL ☐ WS I
☐ WS II ☐ WS III ☐ WS IV ☐ WS V
Supplemental Stream Classification
☐ FWS ☐ HQW ☐ NSW ☐ ORW
☒ Sw ☐ Tr ☐ UWL ☐ w/in 0.5mi. of CA
Other Stream Classification
☐ Anadromous Fish ☐ Area of Environmental Concern
☐ CAMA County ☐ Federal Wild & Scenic Rivers
☐ HSB Required ☐ NC Natural & Scenic Rivers
☐ Impaired [303d] ☐ Primary Nursery Area
☐ TVA ☐ Designated Shellfish Harvesting Area
☐ Designated Public Mountain Trout Waters

Up/Down Stream Features

Upstream Feature: Bridge
Location: 1.9 M.I.E. OF JCT. SR1740
Structure #: 230385 Route: US74 & 76 WBL
Latitude: 34.32256 Longitude: 78.46756
Prior Survey Completed: ☒ Survey Date: 06/19/1979 Bed to Crown (ft): 12.0 Year Built: 1988
Downstream Feature: Bridge
Location: 1.3 M.I.E. OF JCT. SR1757
Structure #: 230363 Route: SR1947
Latitude: 34.29589 Longitude: 78.47609
Prior Survey Completed: ☒ Survey Date: 05/29/2007 Bed to Crown (ft): 23.0 Year Built: 2010
Structure Type: Bridge
Span Arrangement: 1@36.08';4@35';1@36.08' OAL (ft): 212.0
Number of Barrels: @ Span (ft): x Rise (ft):
Structure Type: Bridge
Span Arrangement: 1@44.75';1@49.917';1@50.16';1@50.333' OAL (ft): 195.00
Number of Barrels: @ Span (ft): x Rise (ft):

Preliminary Structure Estimate [Office Estimate]

Structure Type: Skew:
Dimensions/Spans:

Notes

"Green Swamp" as stated by Quadmap.

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE

Run Date: 07/01/2015

COUNTY : COLUMBUS	DIVISION : 6	DISTRICT : 3	STRUCTURE NUMBER : 230077	LENGTH : 196 FEET
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ROUTE CARRIED : NC214	FEATURE INTERSECTED : GREEN SWAMP
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LOCATED : 0.8 MI.E.JCT.SR1757	BRIDGE NAME :	CITY :
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FUNC. CLASS : 07	SYST.ON : FA	SYST.UNDER : NFA	ADT & YR : 2000 2013	RAIL TYPE : LT 141 RT 141
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BUILT : 1922	BY : SHPWC	PROJ : 326	FED.AID PROJ : F1704	DESIGN LOAD : HS 15
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REHAB : 1950	BY : SHPWC	PROJ : 3292	ALIGNMENT : TAN	SKEW : 90	LANES : ON 2 UNDER 0
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NAVIGATION : VC 0 FT	HC 0 FT	HT. CRN. TO BED : 12 FT	WATER DEPTH : 2 FT
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SUPERSTRUCTURE :	REINFORCED CONC.FLOOR ON REINF.CONC.DECK GIRDERS
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SUBSTRUCTURE :	EBT1&IBTS:RC CAPS/TIM.PILE;EBT2:RC ABUT.
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SPANS :	8@24'6
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BEAMS OR GIRDERS :	6LNS. REINF.CONC.DECK GIRDERS
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FLOOR : 7RC/4.5 AWS	ENCROACHMENT :	DECK (OUT TO OUT) : 38 FT
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CLEAR ROADWAY : 33.833 FT	BETWEEN RAILS : 35.833 FT	SIDEWALK OR CURB : LT 1 FT RT 1 FT
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VERT.CL.OVER : 999.9 FT

INV.RTG. : HS-1	OPE.RTG. : HS-1	CONTR.MEMBER : RCDG Wid	POSTED : SV	TTST	DATE
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SYSTEM : Primary N.C. Route	GREEN LINE ROUTE : Y
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UNDER ROUTES AND CLEARANCES

REMARKS :

UP-Stream

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE

Run Date: 11/09/2016

COUNTY :	DIVISION :	DISTRICT :	STRUCTURE NUMBER :	LENGTH :
COLUMBUS	6	3	230385	212 FEET

ROUTE CARRIED :	FEATURE INTERSECTED :
US74 & 76 WBL	FRIAR SWAMP

LOCATED :	BRIDGE NAME :	CITY :
1.9 MI.E. OF JCT.SR1740		

FUNC. CLASS :	SYST.ON :	SYST.UNDER :	ADT & YR :	RAIL TYPE :
02	FA	NFA	6500 2013	LT 41 RT 41

BUILT :	BY :	PROJ :	FED.AID PROJ :	DESIGN LOAD :
1988	DOH	8.1430701	F-4-1(19)	HS 20 + MOD

REHAB :	BY :	PROJ :	ALIGNMENT :	SKEW :	LANES :
			TAN.	90	ON 2 UNDER 0

NAVIGATION :	HT. CRN. TO BED :	WATER DEPTH :
VC 0 FT HC 0 FT 12 FT		5 FT

SUPERSTRUCTURE :	PPC CORED SLAB
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SUBSTRUCTURE :	E.BTS&INT.BTS:RC CAP ON PPC PILES
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SPANS :	1@36.08';4@35';1@36.08'
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BEAMS OR GIRDERS :	13 LINES OF 36" PRESTRESSED CONCRETE CORED SLAB SECTIONS
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FLOOR :	ENCROACHMENT :	DECK (OUT TO OUT) :
PPC.C.S/4" AWS		39 FT

CLEAR ROADWAY :	BETWEEN RAILS :	SIDEWALK OR CURB :
36 FT	36 FT	LT 0 FT RT 0 FT

VERT.CL.OVER :
999.9 FT

INV.RTG. :	OPE.RTG. :	CONTR.MEMBER :	POSTED :	TTST	DATE
HS-30	HS-51	C. Slab 7/16"	SV		

SYSTEM :	GREEN LINE ROUTE :
Primary U.S. Route	Y

UNDER ROUTES AND CLEARANCES

REMARKS :

Downstream

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE

Run Date: 12/20/2016

COUNTY :	DIVISION :	DISTRICT :	STRUCTURE NUMBER :	LENGTH :
COLUMBUS	6	3	230363	195 FEET

ROUTE CARRIED :	FEATURE INTERSECTED :
SR1947	BIG CREEK

LOCATED :	BRIDGE NAME :	CITY :
1.3 MI.E. JCT.SR1757		

FUNC. CLASS :	SYST.ON :	SYST.UNDER :	ADT & YR :	RAIL TYPE :
09	NFA	NFA	370 2013	LT 41 RT 41

BUILT :	BY :	PROJ :	FED.AID PROJ :	DESIGN LOAD :
2010	DOH	8.2430701	BRZ-1947(2)	HS 25 or greater

REHAB :	BY :	PROJ :	ALIGNMENT :	SKEW :	LANES :
			TAN	90	ON 2 UNDER 0

NAVIGATION :	HT. CRN. TO BED :	WATER DEPTH :
VC 0 FT HC 0 FT	23 FT	14 FT

SUPERSTRUCTURE : PRECAST PRESTRESSED CONC.CORED SLAB

SUBSTRUCTURE : EBTS: RC CAPS/H-PILES;IBTS:RC CAPS/18IN.DIA.STL.PIPE PILES

SPANS : 1@44.75';1@49.917';1@50.16';1@50.333'

BEAMS OR GIRDERS : 13 LNS. OF 36" PPC CORED SLAB SECTIONS

FLOOR :	ENCROACHMENT :	DECK (OUT TO OUT) :
PPCCS/1" AWS		39 FT

CLEAR ROADWAY :	BETWEEN RAILS :	SIDEWALK OR CURB :
35.833 FT	35.833 FT	LT 0 FT RT 0 FT

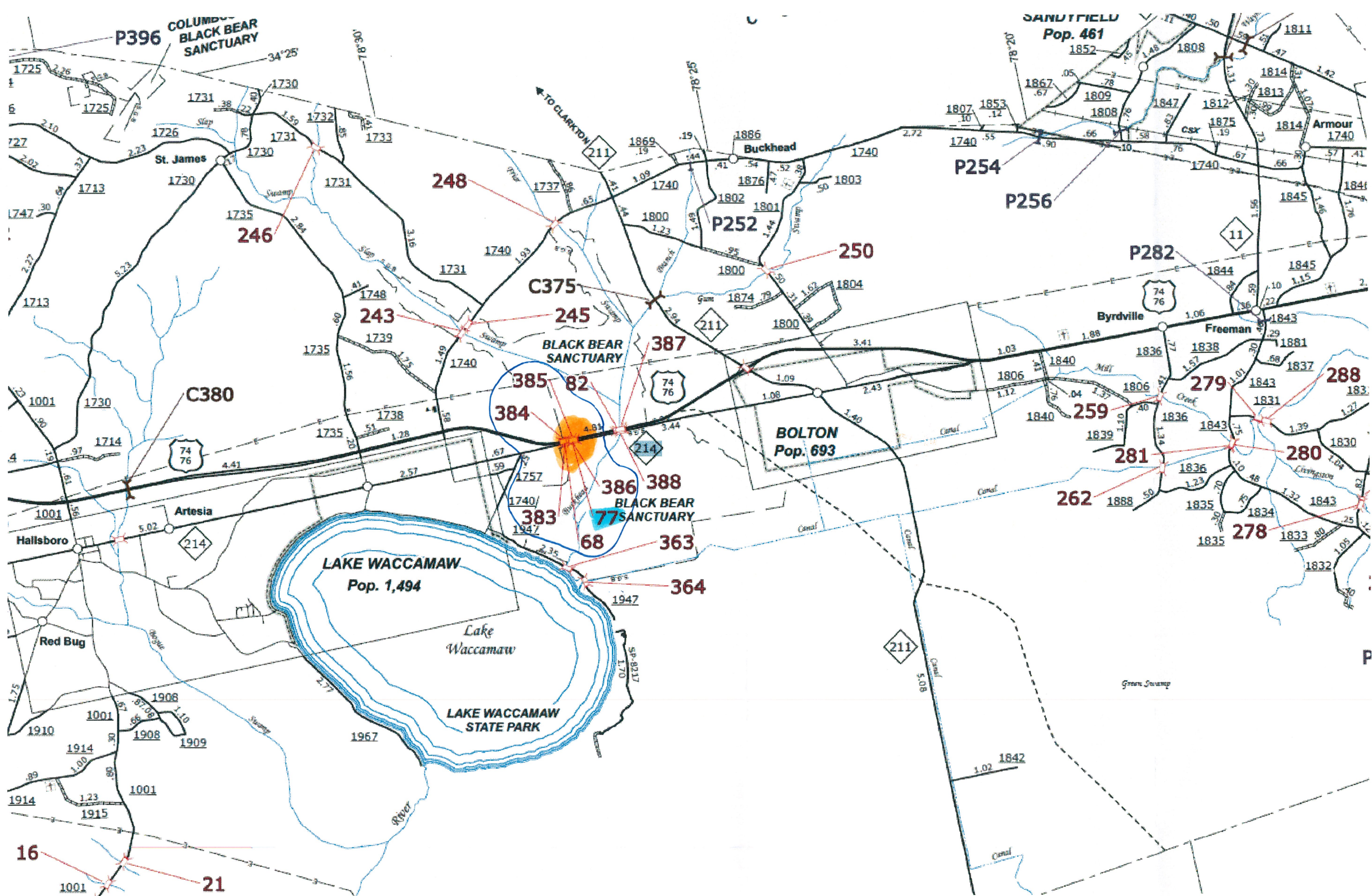
VERT.CL.OVER :
999.9 FT

INV.RTG. :	OPE.RTG. :	CONTR.MEMBER :	POSTED :	DATE
HS-31	HS-51	Spans B-D	SV TTST	08/23/2010

SYSTEM :	GREEN LINE ROUTE :
Secondary S.R. Route	N

UNDER ROUTES AND CLEARANCES

REMARKS :



The screenshot shows a web browser window displaying the 'StreamStats Version 3.0 Basin Characteristics Ungaged Site Report'. The browser's address bar shows the URL: https://streamstats.scr.usgs.gov/v3_beta/BCreport.htm?rcode=NC&workspaceID=. The report title is 'Basin Characteristics Ungaged Site Report'. The report details are as follows:

Date: Thurs Apr 20, 2017 1:03:00 PM GMT-4
Study Area: North Carolina
NAD 1983 Latitude: 34.322 (34 19 19)
NAD 1983 Longitude: -78.4677 (-78 28 04)

Label	Value	Units	Definition
DRNAREA	68.9	square miles	Area that drains to a point on a stream

The browser's status bar at the bottom shows the URL <https://streamstats.usgs.gov/> and a zoom level of 100%.

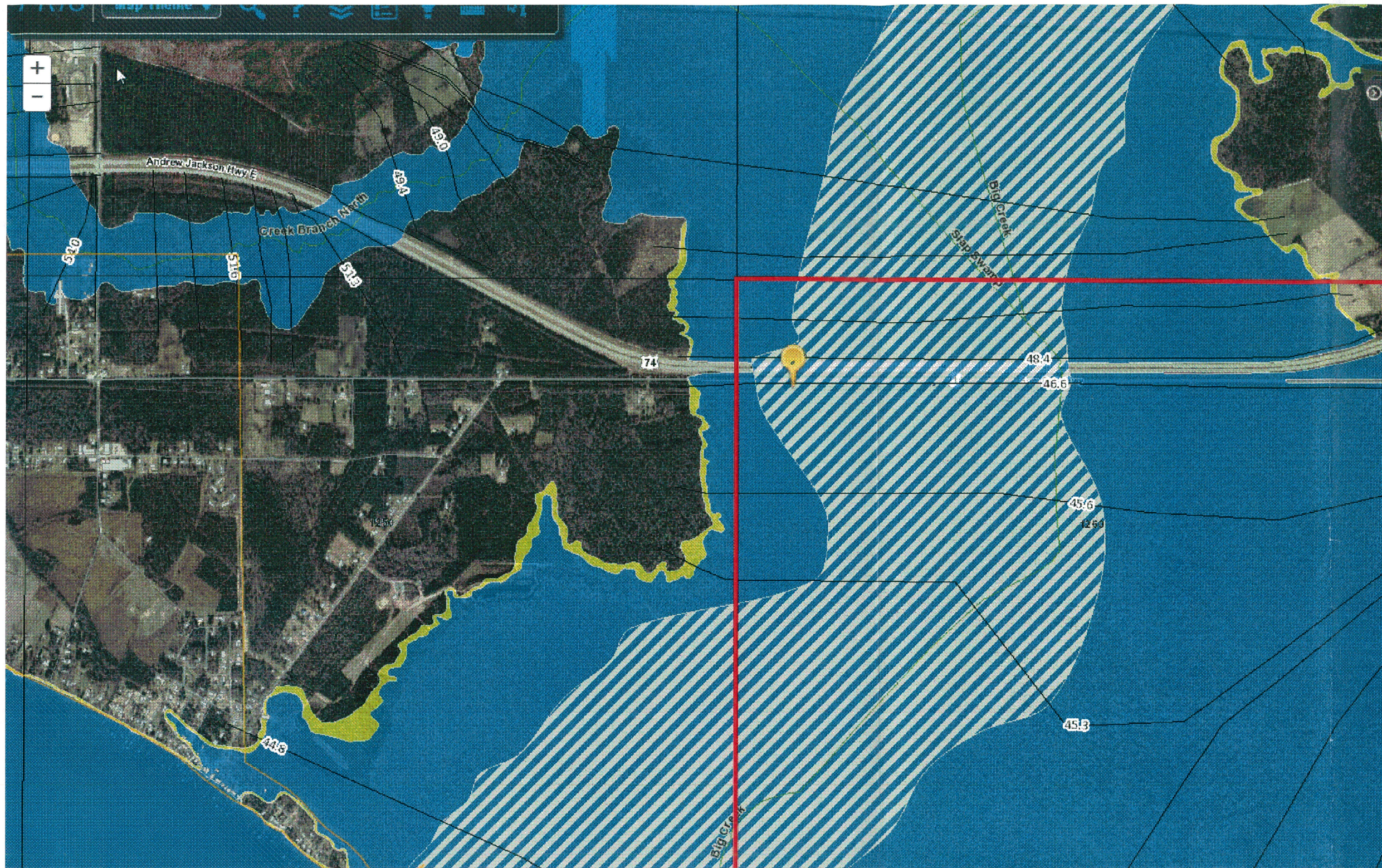
NAD 1983 Longitude: -78.4677 (-78 28 04)

Label	Value	Units	Definition
DRNAREA	68.9	square miles	Area that drains to a point on a stream

<https://streamstats.usgs.gov/>

34.32193, -78.46517

USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, Nat...



Flood Information

Click the map to view information.

Map Location

Flood Zone: **AE (Floodway)**

Flood Source: Big Creek

Base Flood Elevation: 46.8 ft

County: Columbus

Political Area: Columbus County

CID: 370305

Panel: 1260 Download

Map Number: 3720126000J

Panel Effective Date: 6/2/2006

Latitude: 34.32198

Longitude: -78.46748

Address locations are approximate.
 14835 Sam Potts Hwy, Lake Waccamaw, NC

Risk Information

Financial Vulnerability

Flood Insurance

FIS Reports

Engineering Models

Map Export

Data Export

Upstream Structure
230385 1 of 2

Drainage Area 85 mi² Obtained from USGS QUAD 350,000:1

Character of Drainage Area SWAMPY

Highwater Mark(s) _____ Dates _____ Obtained From _____

EL. 47.5 1960 PLANS

Maximum Discharge of Record UNKNOWN Sec. ft. _____ Date _____

Discharge Data Obtained From Tide gauge method

Q₁₀₀ = 5020 cfs Q₁₀₀ = 6150 - 33% = 4000

Period Covered by Discharge Records N/A

Discharge Used for Design of Waterway 5020 - 20% = 4000 Sec. ft. _____

Waterway Area Considered Necessary 1750 ± Sq. Ft. _____

Waterway Area Provided by Recommended Structures 1490 ± Sq. Ft. _____

Data on Existing Structure N/A

Data on other Structures Up or Down Stream 200' ± DO ST.

30-24.5' SPANS & 20-25' SPANS & 50-34' SPANS

1600 ± 4' ± SPANS

Method Used in Determining Foundation Material N/A

Is Additional Foundation Investigation Considered Advisable _____

Other Information SEE ALSO Bridge Survey Report No. 2

OH.W. EL. 45.2

HS EL. 47.4 6-2-79

OVERTAPPING FLOOD! ELEV. 52' ±, FREQUENCY > 500 YEARS

Q₁₀₀ = 4900 cfs Information to be shown on plans

Design Discharge 4000 Frequency 50 YRS.

Design High Water Elev. 47.5 ± 100 YRS. H.W. ELEV. 48.0 ±

Flood of Record UNKNOWN Date _____ Discharge _____ Frequency _____

see sheet2 for str #s

BRIDGE DEPARTMENT
N. C. STATE HIGHWAY COMMISSION
RALEIGH, N. C.

BRIDGE SURVEY REPORT

R-61B 8.1430701

PROJECT NO. R-604459 Columbus COUNTY, STA. SEE INSIDE

BRIDGE OVER FRIAR SWAMP Known as EXPOSED SWAMP

On US-74-76 between Lake Waccamaw and Bolton

Recommended Width of Roadway 44' 40' Skew 90°

Recommended Structure SEE INSIDE

Rip Rap CLASS II TO EL. 48.5

Temporary Crossing NOT ROAD

Present Structure RETAIN

New Location is 222' ± Up, Down Stream from Crossing on Present Road

Nearest Shipping Point Bolton On S.C.L. R. R.

Distance from Shipping Point to Bridge Site is 1 ± miles.

Elevations From B. M. R-113 Brass Disc in Conc. H.W. of Bldg. Elev. 52.47

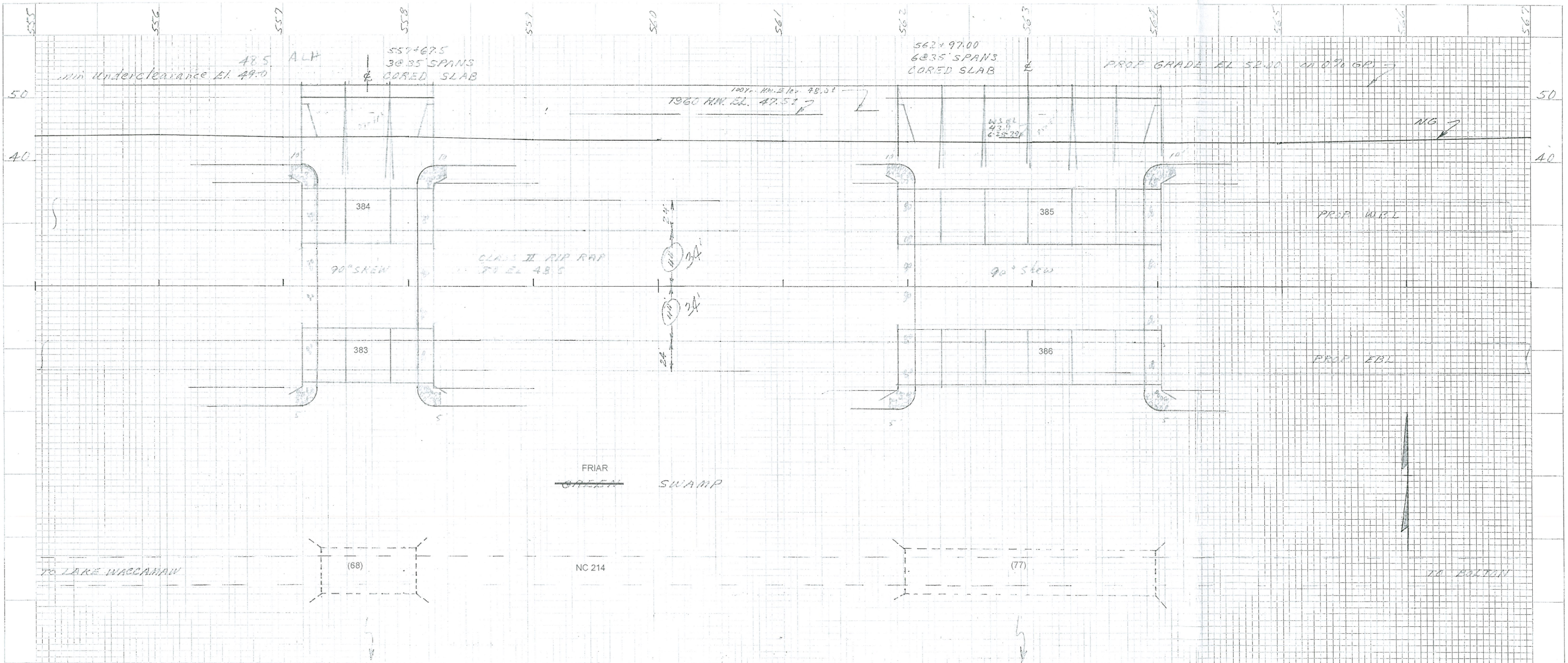
20' LT - L. 562 ± 65 Proj. 6.801570 Datum: M.S.L.

USE THIS SPACE FOR PHOTOGRAPH OF PROPOSED SITE, SHOWING CENTER LINE, DIRECTION OF FLOW AND OTHER IMPORTANT POINTS ON PHOTOGRAPH.

Surveyed by E.A. Ruth Assisted by W.S.R. TRW Date 6-79

11/14 6-19-79 46-04

NP57068



Down Stream Structure
230363 1 of 2

WACCAMAW RIVER BASIN
FEMA DETAIL FLOOD STUDY

Design:	Discharge	3650	c.f.s.	Frequency	25 YR	Elev.	44.1
Base Flood:	Discharge	5300	c.f.s.	Frequency	100 yr.	Elev.	45.0
Overtopping:	Discharge	3650	c.f.s.	Frequency	25 YR	Elev.	44.3
ELEVATIONS FROM HEC-RAS SECTION 3244.636							
(STA 29+88-L)							

ADDITIONAL INFORMATION AND COMPUTATIONS

INTERPOLATED FROM GRAPH OF FEMA DISCHARGES		USGS RURAL REGRESSION	
DA=80.3 SQ. MI.		D.A. = 80.3 SQ. MI.	SAY
$Q_{25} = 3650$ (CES)		$Q_2 = 64.7DA^{0.473} = 1238$ CFS	1200 CFS
FEMA DISCHARGES (AS MODELED IN HEC-RAS FOR COLUMBUS CO. FIS. DATED MAY, 2006)		$Q_5 = 129DA^{0.435} = 2090$ CFS	2100 CFS
		$Q_{10} = 188DA^{0.415} = 2790$ CFS	2800 CFS
$Q_{10} = 2640$ CFS		$Q_{25} = 281DA^{0.393} = 3786$ CFS	3800 CFS
$Q_{50} = 4380$ CFS		$Q_{50} = 367DA^{0.379} = 4650$ CFS	4700 CFS
$Q_{100} = 5300$ CFS		$Q_{100} = 468DA^{0.366} = 5602$ CFS	5600 CFS
$Q_{500} = 7800$ CFS		$Q_{200} = 586DA^{0.354} = 6654$ CFS	6700 CFS
		$Q_{500} = 773DA^{0.339} = 8219$ CFS	8200 CFS
FEMA DISCHARGES USED FOR DESIGN			

FEMA DISCHARGES USED FOR DESIGN

CONTRACTION: OVERTOPPING
 $Y_s = Y_1 \left[\frac{Q_1}{Q_s} \right]^{0.67} = 1$
AREA APPROACH
TOP WIDTH = 330.4 FT = 6.5 FT
 $Y_s = 6.5 \left[\frac{3602.05}{127.46} \right]^{0.67} = 4.4$ FT

LOCAL

PIER 1

$Y_s = Y_1 \left[2K_1 K_2 K_3 K_4 (a/Y_1)^{0.65} F_s^{0.43} \right]$
 $Y_s = WS. EL - BED. EL = 44.2 - 43.43 = 0.77'$
 $F_s = 2.33 \left[\frac{1}{(32.2)(0.77)^2} \right] = 0.47$
 $Y_s = 0.77 \left[\frac{1}{(1)(1)(1)(3.00)(0.77)^{0.65} 0.47^{0.43}} \right] = 3.0$ FT

PIER 2

PIER 3

$Y_s = Y_1 \left[2K_1 K_2 K_3 K_4 (a/Y_1)^{0.65} F_s^{0.43} \right]$
 $Y_s = WS. EL - BED. EL = 44.2 - 35.25 = 8.95'$
 $F_s = 2.33 \left[\frac{1}{(32.2)(8.95)^2} \right] = 0.14$
 $Y_s = 8.95 \left[\frac{1}{(1)(1)(1)(3.08)(0.95)^{0.65} 0.14^{0.43}} \right] = 4.1$ FT

SITE DATA

Drainage Area 80.3 SQ. MI. Source USGS QUAD. MAP/FEMA
River Basin WACCAMAW Character RURAL
Stream Classification (Such as Trout, High Quality Water, etc.) C, SW
Data on Existing Structure 1@30.7', 1@30.0', 1@30.8' CONCRETE T-BEAM, CONCRETE CAP, TIMBER
ABUTMENTS AND TIMBER PILES Waterway Opening 728 SQ. FT. (BELOW 100 YR WATER SURFACE)
Debris Potential: Low X Moderate High
Data on Structures Up and Down Stream UPSTREAM SR 214 #68.3@24' THRU CONCRETE GIRDERS
ABUTMENTS AND BENTS; #77.8@24.5' THRU CONCRETE GIRDERS, ABUTMENTS AND BENTS
DOWNSTREAM: NONE
Design Control Elev. MATCH OR REDUCE EXISTING 100 YR WATER SURFACE ELEVATION
Gage Station No. 0210896450 (TYPE 20) Period of Records N/A
Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information:
Date 1999 Elev. 46.3' Est. Freq. 500 YR+ Source HARRY EDWARDS-PARK RANGER Period of Knowledge 47 YRS
Date Elev. Est. Freq. Source Period of Knowledge
Date Elev. Est. Freq. Source Period of Knowledge

Historical Scour Info.: General N/A Contraction N/A Local N/A
Channel Slope 0.005 Source FEMA FIELD SURVEY Normal Water Surface Elev. 41.7' (ON 12-12-05)
Manning's n: Left 0.16 Channel 0.055 Right 0.16 Source FEMA
Flood Study / Status DETAILED FLOOD STUDY Floodway Established? YES
Flood Study 100 yr. Discharge 5300 c.f.s.; W.S. Elev. With Floodway 45.4' Without Floodway 44.7' (FROM SECTION 2839.766)

DESIGN DATA

Hydrological Method FEMA DISCHARGES W/USGS COASTAL RURAL REGRESSION EQUATIONS TO ESTIMATE DESIGN YR

Hydraulic Design Method HEC-RAS version 3.1.3

Floods Evaluated:	Freq.	Q	Elev.	VS NAT	Backwater VS NAT	Bridge Opening Velocity
10_YR	2640	43.6	0.2	0.1	3.5 FT/SEC	
25_YR	3650	44.1	0.3	0.3	4.6 FT/SEC	
50_YR	4380	44.5	0.4	0.4	5.3 FT/SEC	
100_YR	5300	45.0	0.7	0.7	6.2 FT/SEC	
500_YR	7800	46.1	1.6	1.6	8.5 FT/SEC	
ELEVATIONS FROM HEC-RAS SECTION 3244.636						

ELEVATIONS FROM HEC-RAS SECTION 3244.636
Waterway Opening Provided Below: Design W.S. Elev. 796 SQ. FT. 100yr W.S. Elev. 861 SQ. FT.

Average Channel Velocity (Design) 0.8 f/s Average Overbank Velocity (Design) 0.2 f/s
Computed Scour: General N/A Contraction OT: 4.4 ET Local OT: PIER 1: 3.0 FT PIER 2: 4.1 ET PIER 3: 2.8 FT
Is a Floodway Revision Required? YES

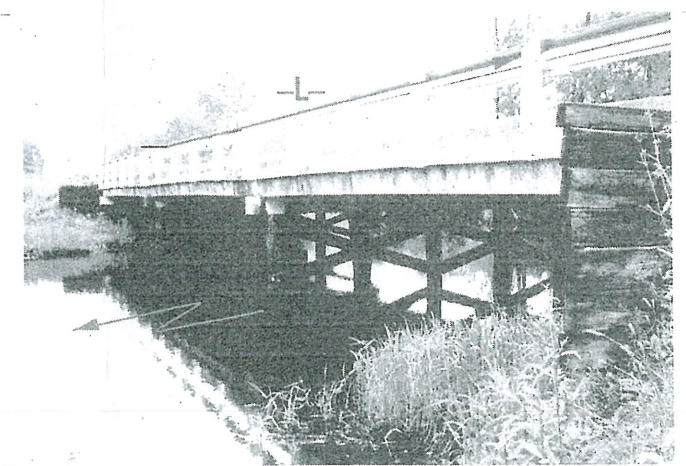
WACCAMAW RIVER BASIN
FEMA DETAIL FLOOD STUDY

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

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

ID. No. B-3830 Project No. 33281.1.1 Proj. Station 20+46 -L
County COLUMBUS Bridge Over BIG CREEK Bridge Inv. No. 363
On Highway SR 1947 Between DEAD END and NC 214
Recommended Structure 1@45', 3@50' 21" CORED SLAB, OAL=195' (NO. DECK DRAINS REQUIRED)
Recommended Width of Roadway 35.83' E-F Skew 90°
Recommended Location Is (Up, At, Down) Stream from Existing Crossing, AT
Nearest Shipping Point WHITEVILLE, NC On CSX R.R., 17 Miles From Bridge
Bench Mark Is BM #2-SPIKE IN 24" PINE TREE -BL- STA. 13+22.46 .62.22 RT Elev. 46.86 Datum: NAVD. 88
Temporary Crossing NOT REQUIRED (STAGED CONSTRUCTION)

FILE: 23 0363 2007 0530 BIG CREEK
Stream BIG CREEK Bridge Inv. No. 363 ID. No. B-3830



Designed by: SUNGATE DESIGN GROUP, PA Date
Assisted by: MLS, RK, JRH, JSE
Project Engineer: W. HENRY WELLS, JR. PE
Reviewed by: [Signature] 5-29-07

