

PREDESIGN/PRESURVEY REPORT

County: Rowan

Project No.:

TIP No.:

Let Date:

WBS No.: 17BP.9.R.36

Bridge No.: 790236

Road No.: SR1221 (Bostian Rd)

Stream: Cold Water Creek

Type of Request:

Date: 7/1/2013

Name:

Assigned to: EMT

Checked by:

Prior Survey Date (attach copy of prior survey):

Study by Scour Section:

Flood Zone: AE

Detail Study: LDS

Date: 06/16/09

Panel No.: 5625

BM Info:

Quad Map: China Grove

Drainage Area: 1.15 sq.mi

From: Quad/Stream Stats

Q25: 600cfs

Q50: 750cfs

Q100: 900cfs

Method: USGS Urban Regression: Region 1

EXISTING BRIDGE INFORMATION

Location: 0.4 Miles North of JCT SR1210 Flat Rock Rd)

Average Daily Traffic: 2010 - 500

Length: 26'

Bed-to-Crown: 10'

Water Depth: 1'

Type of Structure: Tim Deck on I-Beams; End Bnts: Tim Caps, Posts&Sills, Tim Bulkheads

Type of Span(s): 1@25'6

Upstream Structure: N/A

Location:

Bed-to-Crown:

Prior Survey:

Downstream Structure: 790231 – 3 Lines 139X84CM Pipe Arch, 60'5 Along Centerline Pipe

Location: 0.3 Miles North of JCT SR1221 (Bostian Rd)

Bed-to-Crown: 10'

Prior Survey: 09/89

SCS Watershed:

ENVIRONMENTAL

Trout Stream: No

Anadromous Fish: No

Primary Nursery Area: No

High Quality Waters: No

Nutrient Sensitive Waters: No

Near Water Supply Intake:

CAMA County: No

Stream Classification: N/A: Not Applicable or Out of State

Notes: None

DENR River Basin Info: Yadkin/Pee-Dee

MAINTENANCE COORDINATION

Bridge Maintenance – Contact Superintendent and Supervisor.

High Water:

Relocation:

New Alignment Staked:

BM Information:

Road Maintenance – Contact District Engineer and County Maintenance Engineer.

High Water:

Road to be Paved:

Relocation of Vicinity of Bridge:

New Alignment Staked:

BM Information:

Initiated as:

Date Initiated:

Man-days Estimated:

Date Surveyed:

Date Completed:

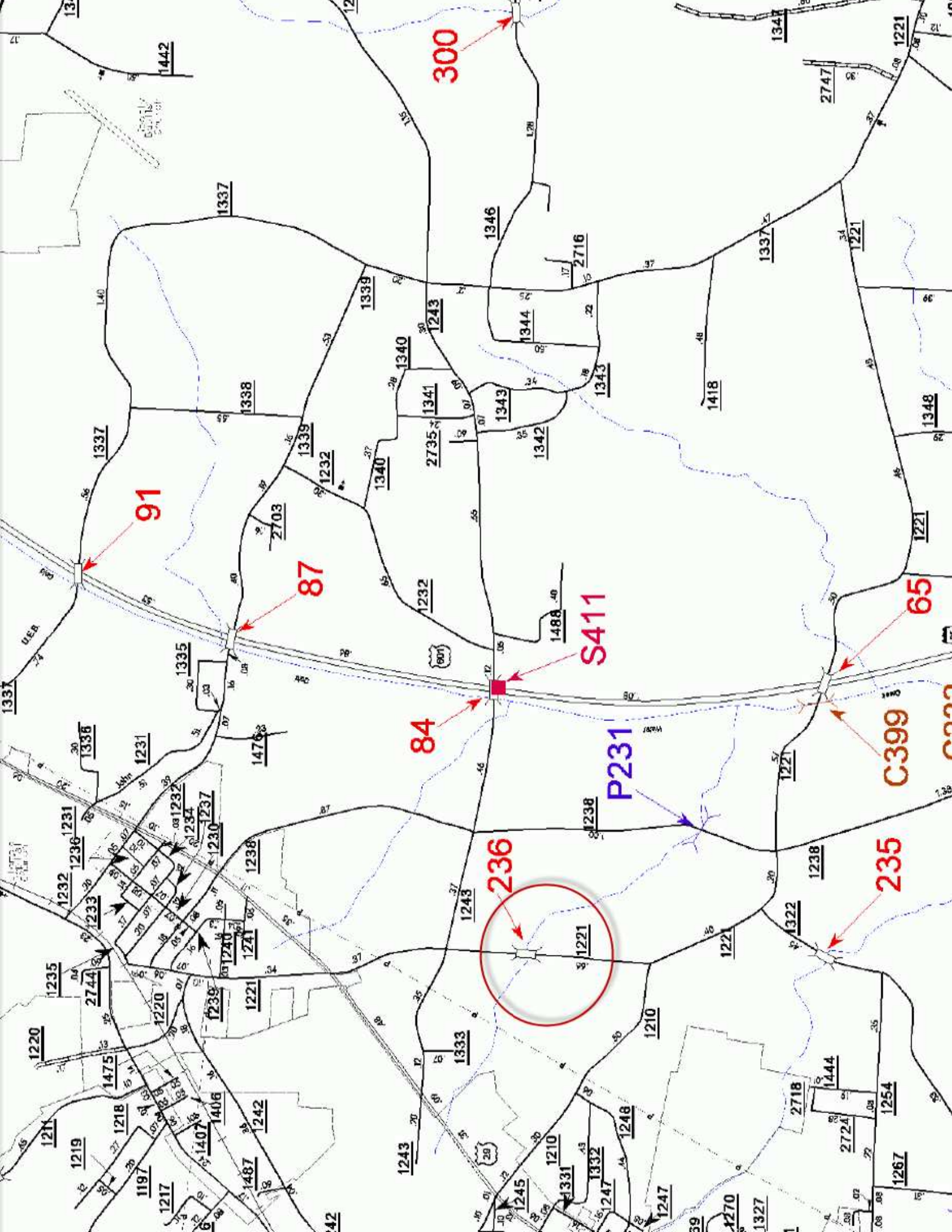
Personnel

Hours

Pay Period

Redelineation

Comments:





NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
BRIDGE MANAGEMENT UNIT

ATTENTION

BRIDGE INSPECTION REPORT

INSPECTION TYPE: Routine Inspection

COUNTY ROWAN BRIDGE NUMBER 790236 INSPECTION CYCLE 2 YRS
ROUTE SR1221 ACROSS CREEK M.P. 0

LOCATION 0.4 MI. N. JCT. SR1210

SUPERSTRUCTURE TIMBER DECK ON I-BEAMS

SUBSTRUCTURE END BENTS:TIMBER CAPS,POSTS & SILLS,TIMBER BULKHEADS

SPANS 1@25'6

LONGITUDE 80° 35' 17.23"

LATITUDE 35° 32' 23.27"

PRESENT CONDITION FAIR

INVENTORY RATING

INSPECTION DATE 08/15/2012

OPERATING RATING

PRESENT POSTING SV 15 TTST 20 SV 15 TTST 20

PROPOSED POSTING

COMPUTER UPDATE

ANALYSIS DATE

POSTING LETTER DATE

SUFFICIENCY RATING

OTHER SIGNS PRESENT 4 DELINEATORS



LOOKING NORTH

SIGN NOTICE
ISSUED FOR

NUMBERED
REQUIRED

<u>No</u>	WEIGHT LIMIT	<u></u>
<u>No</u>	DELINEATORS	<u></u>
<u>No</u>	NARROW BRIDGE	<u></u>
<u>No</u>	ONE LANE BRIDGE	<u></u>
<u>No</u>	LOW CLEARANCE	<u></u>

NATIONAL BRIDGE INVENTORY----- STRUCTURE INVENTORY AND APPRAISAL

Run Date: 09/13/2012

IDENTIFICATION				CLASSIFICATION			
(1) STATE NAME -NORTH CAROLINA	BRIDGE	790236		SUFFICIENCY RATING =		28.25	
(8) STRUCTURE NUMBER(FEDERAL)		000000001590236		STATUS =	Functionally Obsolete		
(5) INVENTORY ROUTE (ON/UNDER) - ON		31012210					
(2) STATE HIGHWAY DEPARTMENT DISTRICT		1					
(3) COUNTY CODE	159	(4) PLACE CODE	36860	(112)NBIS BRIDGE SYSTEM -		YES	
(6) FEATURE INTERSECTED - CREEK				(104)HIGHWAY SYSTEM	Is not on NHS	0	
(7) FACILITY CARRIED SR1221				(26) FUNCTIONAL CLASS -	Local	19	
(9) LOCATION 0.4 MI. N. JCT. SR1210				(100)STRAHNET HIGHWAY -	Not a STRAHNET Route	0	
(11)MILEPOINT		0		(101)PARALLEL STRUCTURE -	No Parallel Structure	N	
(16)LAT 35° 32' 23.27"	(17)LONG	80° 35' 17.23"		(102)DIRECTION OF TRAFFIC -	2-way Traffic	2	
(98)BORDER BRIDGE STATE CODE		PCT SHARE		(103)TEMPORARY STRUCTURE -	Temporary Structure/Conditions	T	
(99)BORDER BRIDGE STRUCTURE NO				(110)DESIGNATED NATIONAL NETWORK -	Not on the National Network	0	
				(20) TOLL	On Free Road	3	
				(31) MAINTAIN -	State Highway Agency	01	
				(22) OWNER -	State Highway Agency	01	
				(37) HISTORICAL SIGNIFICANCE -	Not Eligible	5	
STRUCTURE TYPE AND MATERIAL				CONDITION			
(43) STRUCTURE TYPE MAIN: Steel				(58) DECK		5	
TYPE - Stringer Multibeam or Girder		CODE	302	(59) SUPERSTRUCTURE		6	
(44) STRUCTURE TYPE APPR :				(60) SUBSTRUCTURE		5	
TYPE -		CODE	000	(61) CHANNEL & CHANNEL PROTECTION		7	
(45) NUMBER OF SPANS IN MAIN UNIT		1		(62) CULVERTS		N	
(46) NUMBER OF APPROACH SPANS							
(107)DECK STRUCTURE TYPE - 8		CODE		LOAD RATING AND POSTING			
(108)WEARING SURFACE / PROTECTIVE SYSTEM :				(31) DESIGN LOAD	Unknown	0	
(A) TYPE OF WEARING SURFACE -		CODE		(63) OPERATING RATING METHOD -	Load Factor		
(B) TYPE OF MEMBRANE -		CODE		(64) OPERATING RATING -	HS-1	101	
(C) TYPE OF DECK PROTECTION -		CODE		(65) INVENTORY RATING METHOD -	Load Factor		
				(66) INVENTORY RATING -	HS-1	101	
				(70) BRIDGE POSTING -	Posting Required	0	
				(41) STRUCTURE OPEN, POSTED, OR CLOSED		P	
				DESCRIPTION -	Posted for Load		
AGE AND SERVICE				APPRAISAL			
(27) YEAR BUILT		1963		(67) STRUCTURAL EVALUATION		3	
(106)YEAR RECONSTRUCTED				(68) DECK GEOMETRY		4	
(42) TYPE OF SERVICE : ON - Highway				(69) UNDERCLEARANCES,VERTI & HORIZ		N	
UNDER - Waterway		CODE	15	(71) WATERWAY ADEQUACY		7	
(28) LANES: ON STRUCTURE 2 UNDER STRUCTURE		0		(72) APPROACH ROADWAY ALIGNMENT		7	
(29) AVERAGE DAILY TRAFFIC		500		(36) TRAFFIC SAFETY FEATURES		0000	
(30) YEAR OF ADT 2010	(109) TRUCK ADT PCT	7%		(113)SCOUR CRITICAL BRIDGES		U	
(19) BYPASS OR DETOUR LENGTH		0 MI					
GEOMETRIC DATA				PROPOSED IMPROVEMENTS			
(48) LENGTH OF MAXIMUM SPAN		25 FT		(75) TYPE OF WORK -		CODE	
(49) STRUCTURE LENGTH		26 FT		(76) LENGTH OF STRUCTURE IMPROVEMENT			
(50)CURB OR SIDEWALK: LEFT .5 FT RIGHT .5 FT				(94) BRIDGE IMPROVEMENT COST			
(51) BRIDGE ROADWAY WIDTH CURB TO CURB		24.083 FT		(95) ROADWAY IMPROVEMENT COST			
(52) DECK WIDTH OUT TO OUT		25.417 FT		(96) TOTAL PROJECT COST			
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS)		19 FT		(97) YEAR OF IMPROVEMENT COST ESTIMATE			
(33) BRIDGE MEDIAN - No Median		CODE	0	(114)FUTURE ADT 1020	(115) YEAR FUTURE ADT	2025	
(34) SKEW 0°	(35) STRUCTURE FLARED	0					
(10) INVENTORY ROUTE MIN VERT CLEAR		999.9 FT		INSPECTIONS			
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR		24.083 FT		(90) INSPECTION DATE		08/15/2012	
(53) MIN VERT CLEAR OVER BRIDGE RDWY		999.9 FT		(92) CRITICAL FEATURE INSPECTION :		(93) CFI DATE	
(54) MIN VERT UNDERCLEAR REF Not a Highway or Railroad		0 FT		A) FRACTURE CRIT DETAIL -	NO	A)	
(55) MIN LAT UNDERCLEAR RT REF Not a Highway or Railroad		000 FT		B) UNDERWATER INSP -	NO	B)	
(56) MIN LAT UNDERCLEAR LT REF -		000 FT		C) OTHER SPECIAL INSP	NO	C)	
				SCOUR			
NAVIGATION DATA							
(38) NAVIGATION CONTROL - No Navigational Control		CODE	0				
(111)PIER PROTECTION -		CODE					
(39) NAVIGATION VERTICAL CLEARANCE		0					
(116)VERT - LIFT BRIDGE NAV MIN VERT CLEAR		FT					
(40) NAVIGATION HORIZONTAL CLEARANCE		0 FT					

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE

Run Date: 09/13/2012

COUNTY :	DIVISION :	DISTRICT :	STRUCTURE NUMBER :	LENGTH :	
ROWAN	9	1	790236	26	FEET

ROUTE CARRIED :	FEATURE INTERSECTED :
SR1221	CREEK

LOCATED :	BRIDGE NAME :	CITY :
0.4 MI. N. JCT. SR1210		*LANDIS

FUNC. CLASS :	SYST.ON :	SYST.UNDER :	ADT & YR :	RAIL TYPE :
19	NFA	NFA	500 2010	LT 227 RT 227

BUILT :	BY :	PROJ :	FED.AID PROJ :	DESIGN LOAD :
1963	BMU			Unknown

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	10	FT

SUPERSTRUCTURE :	TIMBER DECK ON I-BEAMS
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SUBSTRUCTURE :	END BENTS:TIMBER CAPS,POSTS & SILLS,TIMBER BULKHEADS
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SPANS :	1@25'6
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BEAMS OR GIRDERS :	11 LINES OF W12X27 I-BEAMS @ 2'4 CENTERS
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FLOOR :	ENCROACHMENT :	DECK (OUT TO OUT) :
4X8 TIM,2.5 AWS		25.417 FT

CLEAR ROADWAY :	BETWEEN RAILS :	SIDEWALK OR CURB :
24.083 FT	25.083 FT	LT .5 FT RT .5 FT

VERT.CL.OVER :
999.9 FT

INV.RTG. :	OPE.RTG. :	CONTR.MEMBER :	POSTED :				
HS-1	HS-1	IB (Sec.Loss)	SV 15	TTST	20	DATE	10/11/2010

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

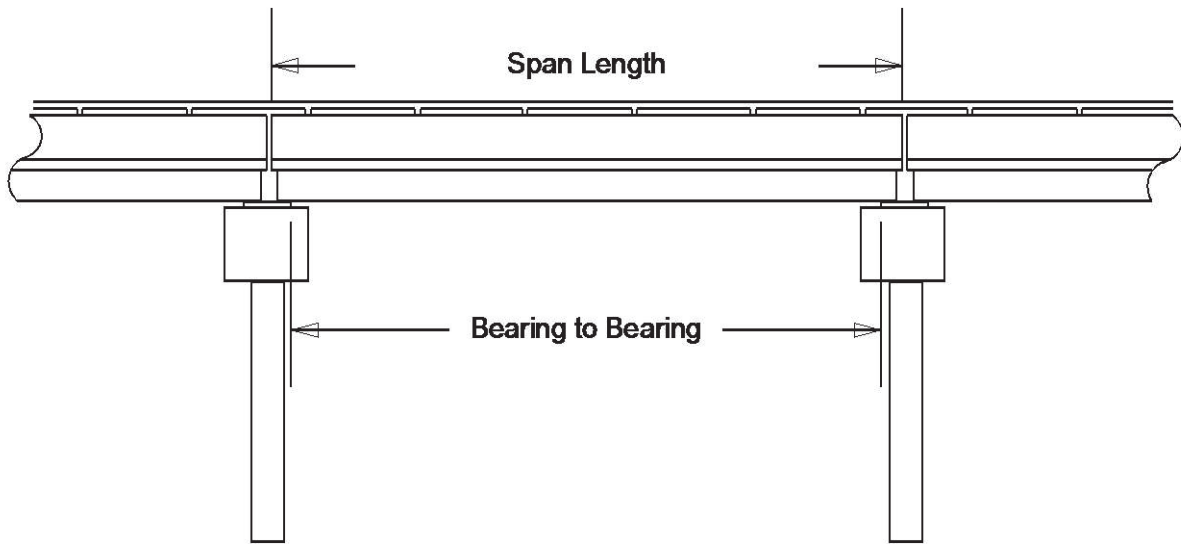
UNDER ROUTES AND CLEARANCES

REMARKS :

Structure Data Worksheet

Spans

County: ROWAN Structure No: 790236 Date: 08/15/2012 Inspected By: TFM



Span No	Span Length	Bearing to Bearing	Comments
1	25.5	24.667	NBIS BL 23.5

Stream Bed Soundings

(See next sheet for profile sketch)

Bridge No: 790236 County: ROWAN Date: 08/15/2012 By: TFM

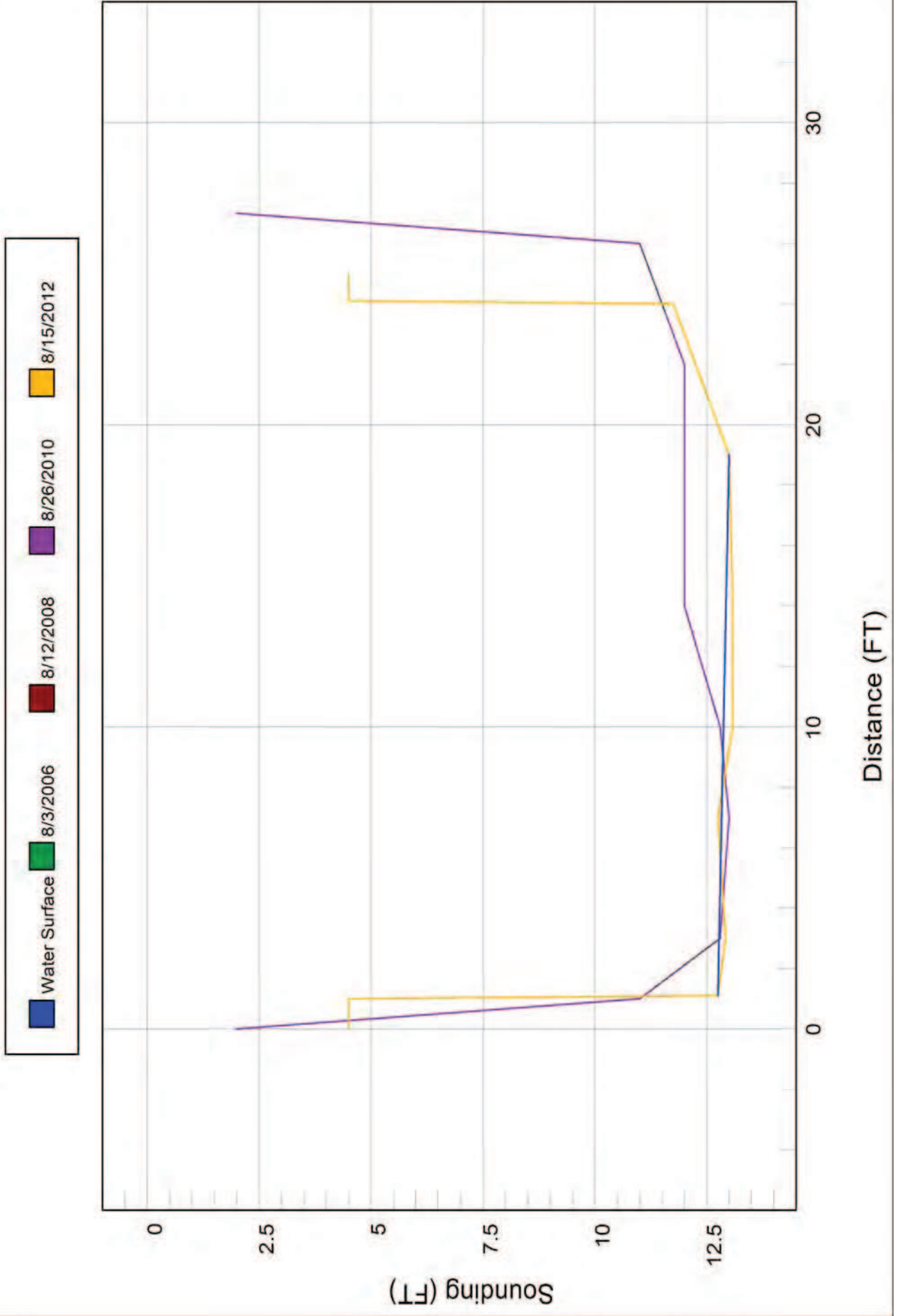
Record sounding from top of rail. Other location if needed: _____

Distance from Highwater Mark to top of rail: _____ Location of Highwater Mark: _____

DOWNSTREAM			UPSTREAM		
Distance (Station) (ft)	Sounding (ft)	Description	Distance (Station) (ft)	Sounding (ft)	Description
0	4.5	Top of Cap			
1	4.5	Top of Cap	1	11	END BENT 1
1.1	12.75	Water Surface/Water Edge (WSWE)			
3	12.92				
7	12.75				
10	13.08				
14	13.08				
19	13	Water Surface/Water Edge (WSWE)			
24	11.75				
24.1	4.5	Top of Cap			
25	4.5	Top of Cap			

STREAMBED PROFILE (Downstream)

Top of Rail = 0 FT (Sounding)



Bridge Inspection Field Sketch



Roadway	19ft Wide	2 Paved Lanes	Looking North
Left Shoulder	6ft Wide		6ft Unpaved
Right Shoulder	6ft Wide		6ft Unpaved

MEASUREMENTS VERIFIED BY DH 8/15/2012

Title

APPROACH ROADWAY SKETCH

Description

APPROACH ROADWAY SKETCH

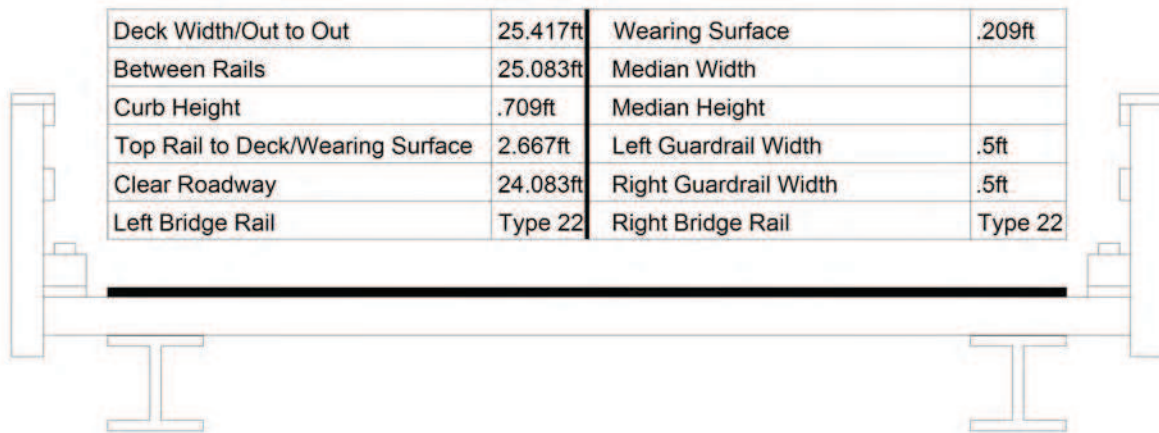
Bridge No: 790236

Drawn By: GDP

Date: 08/12/08

File Name: S0066001620

Bridge Inspection Field Sketch



Measurements for Span #	1		
Deck Thickness	.313	Left Overhang	1.0435
Top of Rail to Bottom of Beam	4.5	Right Overhang	1.0435

Beam No	Beam Type	Spacing	Comments
1	Steel I Beam	2.333ft	
2	Steel I Beam	2.333ft	
3	Steel I Beam	2.333ft	
4	Steel I Beam	2.333ft	
5	Steel I Beam	2.333ft	
6	Steel I Beam	2.333ft	
7	Steel I Beam	2.333ft	
8	Steel I Beam	2.333ft	
9	Steel I Beam	2.333ft	
10	Steel I Beam	2.333ft	
11	Steel I Beam		

BEAM SIZE: 1ft HIGH X .542ft WIDE X .031ft FLANGE X .02ft WEB

MEASUREMENTS VERIFIED BY DH 8/15/2012

Title

STRUCTURE DATA SKETCH

Description

STRUCTURE DATA SKETCH

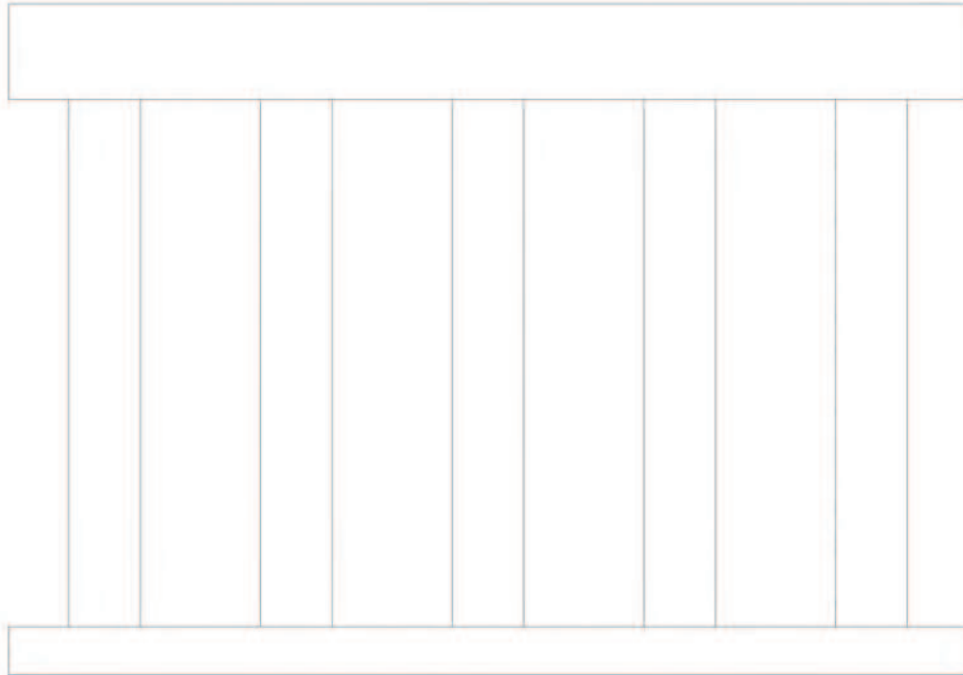
Bridge No: 790236

Drawn By: GDP

Date: 08/12/08

File Name: S0066001621

Bridge Inspection Field Sketch



Abutment #	2		
Cap - Beam Type (Wood or Steel)			
Cap Size	25.5ft Long	.833ft Wide	.98ft High
Left Overhang	1.084ft	Lt Cap/Beam Overhang	
Right Overhang	1.084ft	Rt Cap/Beam Overhang	
Sill - Sill			
Sill Size			

Pile #	Material	Pile Type	Spacing	Length	Width/Diam.	Height	Orientation
1	Wood or Timber	Pile Bent	5.833		.792 X .833	POST	Vertical
2	Wood or Timber	Pile Bent	5.833		.792 X .833	POST	Vertical
3	Wood or Timber	Pile Bent	5.833		.792 X .833	POST	Vertical
4	Wood or Timber	Pile Bent	5.833		.792 X .833	POST	Vertical
5	Wood or Timber	Pile Bent			.792 X .833	POST	Vertical

MEASUREMENTS VERIFIED BY DH 8/15/2012

Title		Description	
PILE DIAGRAM END BENTS		PILE DIAGRAM END BENTS	
Bridge No:	790236	Drawn By:	GDP
Date:	08/12/08	File Name:	S0066001622

Bridge Inspection Field Sketch



Cap Information			Material Timber							
Length	Width	Height	Left Overhang	Right Overhang	Left Beam to End of Cap.	Right Beam to End of Cap.				
26.000 ft.	.833 ft.	.98 ft.	1.500 ft.	1.500 ft.	1.333 ft.	1.250 ft.				
Subcap Information			Material							
Length	Width	Height	Left Overhang	Right Overhang	Left Pile to Splice.					
Sill Information			Material							
Length	Width	Height								
Pile #	Material	Spacing	Width/Dia.	Height	Length	Orientation	Driven?	Replacement?	Removed?	Collar?
1	Timber	4.8750 ft.				Vertical	No	No	No	No
2	Timber	0.833 ft.				Vertical	No	Yes	No	No
3	Timber	5.7917 ft.				Vertical	No	No	No	No
4	Timber	5.667 ft.				Vertical	No	No	No	No
5	Timber	4.8750 ft.				Vertical	No	No	No	No
6	Timber					Vertical	No	No	No	No
Bent/Abutment #: 1			Similar Bents:							

Title
END BENT 1

Description
END BENT 1

Bridge No: 790236

Drawn By: DH

Date: 8/16/2012

File Name: S0066074562



SOUTH END APPROACH



WEAR SURFACE AT END BENT 1



LOOKING DOWNSTREAM



WEAR SURFACE ON DECK



WEAR SURFACE ON DECK



WEAR SURFACE AT END BENT 2



LOOKING SOUTH



END BENT 1



LOOKING DOWNSTREAM



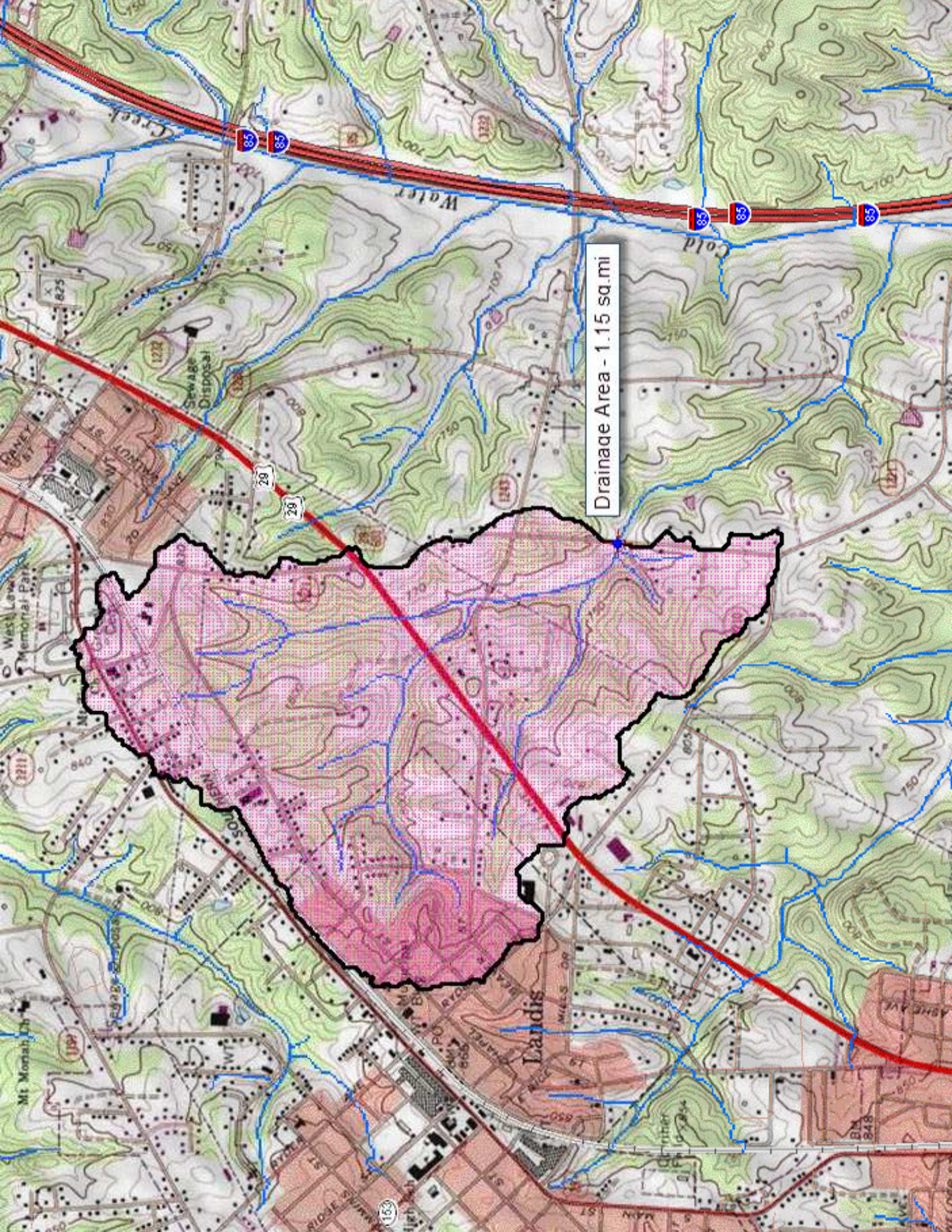
LOOKING UPSTREAM



LOOKING AT EAST SIDE



LOOKING AT WEST SIDE



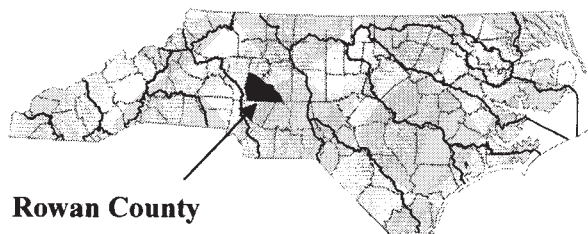
Drainage Area - 1.15 sq. mi

FLOOD INSURANCE STUDY

A Report of Flood Hazards in

ROWAN COUNTY, NORTH CAROLINA

AND INCORPORATED AREAS



Community Name	Community Number	River Basin
China Grove, Town of	370210	Yadkin
Cleveland, Town of	370097	Yadkin
East Spencer, Town of	370211	Yadkin
Faith, Town of	370352	Yadkin
Granite Quarry, Town of	370212	Yadkin
Landis, Town of	370213	Yadkin
Rockwell, Town of	370214	Yadkin
Rowan County (Unincorporated Areas)	370351	Yadkin
Salisbury, City of	370215	Yadkin
Spencer, Town of	370216	Yadkin



VOLUME 1 OF 3

June 16, 2009

**Federal Emergency Management Agency
State of North Carolina**

**Flood Insurance Study Number
37159CV001A**

www.fema.gov and www.ncfloodmaps.com



Section 4.0 – Area Studied

Table 3—Flooding Sources Studied by Detailed Methods: Revised or Newly Studied

Source	Riverine Sources		Affected Communities
	From	To	
Trexler Creek	The confluence with Crane creek	Approximately 0.2 mile upstream of U.S. Highway 52 (North Salisbury Avenue)	Town of Granite Quarry
Woodleaf Branch (East) **	The confluence with Grants Creek	Approximately 1,700 feet downstream of Lincolnton Road	City of Salisbury

* Revised to reflect backwater effects from new detailed study.

** Revised to reflect flooding controlled by Grants Creek and backwater effects from new detailed study.

Table 4, “Flooding Sources Studied by Detailed Methods: Redelineated,” contains a list of flooding sources that were studied by detailed methods for previous FISs, but were only partially revised in the current study. Their effective analyses remain valid; however, their floodplain delineations have been revised on the current FIRM.

Table 4—Flooding Sources Studied by Detailed Methods: Redelineated

Source	Riverine Sources		Affected Communities
	From	To	
Beaver Creek	The confluence with Cold Water Creek	Approximately 1,750 feet upstream of Milton Street	Rowan County (Unincorporated Areas), Town of Landis
Bostian Heights Branch	The confluence with Dutch Buffalo Creek	Approximately 185 feet upstream of Scercy Road (SR 1346)	Rowan County (Unincorporated Areas)
Cold Water Creek	Approximately 0.5 mile upstream of Moose Road (SR 1308)	Approximately 0.5 mile upstream of Lentz Road	Rowan County (Unincorporated Areas)
Crane Creek	Approximately 100 feet downstream of North Main Street	Old Concord Road (SR 1002)	Rowan County (Unincorporated Areas), Town of Granite Quarry
Draft Branch	Approximately 0.9 mile upstream of the confluence with Grants Creek	Neel Road (SR 1729)	Rowan County (Unincorporated Areas), City of Salisbury
Dutch Buffalo Creek	The Rowan/Cabarrus County boundary	Approximately 130 feet upstream of Rogers Road (SR 2573)	Rowan County (Unincorporated Areas)
Julian Tributary	The confluence with Town Creek	Approximately 60 feet upstream of Julian Road	City of Salisbury
Lake Wright Branch*	Approximately 1,500 feet upstream of the confluence with Grants Creek	Approximately 0.6 mile upstream of Brown Road (SR 1211)	Rowan County (Unincorporated Areas), Town of China Grove

Section 5.0 – Engineering Methods

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Church Creek Tributary 1A	Approximately 540 feet downstream of Fish Pond Road (SR 2309)	0.7	*	*	579	*
	Approximately 110 feet downstream of Fish Pond Road (SR 2309)	0.6	*	*	556	*
	Approximately 0.2 mile upstream of Fish Pond Road (SR 2309)	0.6	*	*	535	*
	Approximately 0.3 mile upstream of Fish Pond Road (SR 2309)	0.5	*	*	479	*
	Approximately 0.5 mile upstream of Fish Pond Road (SR 2309)	0.3	*	*	314	*
Church Creek Tributary 2	At the confluence with Church Creek	2.7	*	*	1,403	*
	Approximately 0.2 mile downstream of Stone Road	2.2	*	*	1,238	*
	Approximately 400 feet upstream of Stone Road	2.0	*	*	1,188	*
	Approximately 0.5 mile upstream of Stone Road	1.2	*	*	906	*
	Approximately 0.2 mile downstream of Percy Lane	1.1	*	*	855	*
	Approximately 750 feet downstream of Percy Lane	0.9	*	*	815	*
	Approximately 545 feet downstream of Percy Lane	0.9	*	*	797	*
	Approximately 335 feet upstream of Percy Lane	0.8	*	*	780	*
Coddle Creek	At the Cabarrus/Iredell/Rowan County boundary	15.6	2,903	4,791	5,738	8,370
Cold Water Creek	Approximately 0.5 mile upstream of Moose Road (SR 1308)	12.8	2,300	3,630	4,170	5,480
	At Old Beatty Ford Road (SR 1211)	7.2	1,675	2,700	3,120	4,190

Section 5.0 – Engineering Methods

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cold Water Creek	At Daugherty Road (SR 1243)	4.2	1,230	2,040	2,400	3,220
	At Pine Ridge Road (SR 1232)	3.4	1,100	1,850	2,200	2,960
	Approximately 0.5 mile upstream of Lentz Road	3.2	600	1,350	1,700	2,460
Cold Water Creek Tributary	*	*	*	*	*	*
Cold Water Creek Tributary 1	At the confluence with Cold Water Creek	1.3	*	*	892	*
	Approximately 653 feet upstream of the confluence with Cold Water Creek	1.2	*	*	850	*
	Approximately 0.2 mile upstream of the confluence with Cold Water Creek	1.2	*	*	841	*
Concord Road Creek	*	*	*	*	*	*
Correll Creek	*	*	*	*	*	*
Crane Creek	Approximately 1.3 miles upstream of the confluence with Church Creek	46.9	9,238	12,040	12,860	14,966
	At the confluence of Town Creek	25.1	7,093	9,240	9,819	11,293
	Approximately 1.1 miles upstream of the confluence of Town Creek	24.0	7,026	9,131	9,693	11,121
	Approximately 2.4 miles upstream of the confluence of Town Creek	22.1	6,879	8,912	9,444	10,793
	Approximately 4.7 miles upstream of the confluence of Town Creek	19.7	6,710	8,647	9,139	10,382
	Approximately 1.1 miles downstream of US Highway 52 / East Innes Street	18.6	6,122	8,011	8,506	9,763
	Approximately 0.2 miles downstream of US Highway 52 / East Innes Street	18.3	6,077	7,952	8,442	9,687

Section 5.0 – Engineering Methods

channel geometry between bridges and culverts. Overbank cross section data for the backwater analyses were obtained from recently flown LIDAR data.

Channel roughness factors (Manning's "n") used in the hydraulic computations were made in the field by an engineer where stream access was possible, with orthophotos used to supplement areas that could not be accessed. The channel and overbank "n" values for all of the streams studied by detailed methods are shown in Table 11, "Roughness Coefficients."

Table 11—Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Back Creek	0.042 – 0.048	0.050 – 0.130
Back Creek Tributary 1	0.050	0.080 – 0.150
Baker Branch	0.025 – 0.070	0.025 – 0.100
Beaver Creek	0.025 – 0.070	0.025 – 0.100
Beaver Creek Tributary	0.025 – 0.070	0.025 – 0.100
Beaverdam Creek (East)	0.042 – 0.052	0.080 – 0.140
Beaverdam Creek (West)	0.035 – 0.040	0.060 – 0.100
Bell Branch	0.025 – 0.070	0.025 – 0.100
Bost Branch	0.050	0.100 – 0.150
Bostian Heights Branch	0.050	0.080 – 0.140
Byrd Road Tributary	0.025 – 0.070	0.025 – 0.100
Cedar Creek	0.040	0.120 – 0.130
Cemetery Creek	0.025 – 0.070	0.025 – 0.100
Church Creek	0.035 – 0.050	0.080 – 0.150
Church Creek Tributary 1	0.050	0.080 – 0.130
Church Creek Tributary 1A	0.045	0.080 – 0.130
Church Creek Tributary 2	0.045	0.090 – 0.120
Coddle Creek	0.040 – 0.050	0.080 – 0.150
Cold Water Creek	0.025 – 0.070	0.025 – 0.100
Cold Water Creek Tributary	0.025 – 0.070	0.025 – 0.100
Cold Water Creek Tributary 1	0.050	0.080 – 0.140
Concord Road Creek	0.025 – 0.070	0.025 – 0.100
Correll Creek	0.025 – 0.040	0.025 – 0.060
Crane Creek	0.040 – 0.045	0.045 – 0.130
Crane Creek Tributary 1	0.040 – 0.045	0.080 – 0.120
Crane Creek Tributary 2	0.045	0.090 – 0.130
Draft Branch	0.025 – 0.070	0.025 – 0.100
Draft Branch Tributary	0.025 – 0.070	0.025 – 0.100
Dutch Buffalo Creek	0.035 – 0.045	0.080 – 0.140
Dutch Buffalo Creek Tributary	0.025 – 0.070	0.025 – 0.100
Dutch Buffalo Creek Tributary 1	0.045	0.080 – 0.150
East Centerview Branch	0.025 – 0.070	0.025 – 0.100
East Fork Creek	0.035 – 0.050	0.050 – 0.140

Section 5.0 – Engineering Methods

Table 12—Limited Detailed Flood Hazard Data

Cross Section ¹	Stream Station ²	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)	Non-Encroachment Width ³ (feet)
CHURCH CREEK TRIBUTARY 1A				
100	9,965	556	738.0	12 / 29
104	10,379	535	741.3	12 / 26
108	10,767	479	744.5	48 / 12
112	11,207	479	746.9	13 / 11
117	11,742	479	751.9	12 / 17
CHURCH CREEK TRIBUTARY 2				
007	726	1,403	732.9 ⁴	97 / 55
015	1,515	1,403	733.5	47 / 187
020	1,998	1,238	734.8	44 / 188
025	2,457	1,238	737.0	86 / 127
030	2,964	1,238	740.6	129 / 32
033	3,322	1,188	741.0	109 / 84
039	3,876	1,188	742.3	49 / 83
044	4,355	1,188	744.2	36 / 83
048	4,805	1,188	746.0	106 / 63
051	5,074	906	747.0	46 / 128
053	5,343	906	747.8	32 / 56
059	5,911	855	750.4	32 / 60
063	6,285	815	752.3	32 / 74
068	6,828	797	756.5	14 / 32
COLD WATER CREEK				
776	77,617	3,940	650.0	867 / 483
779	77,931	4,015	650.0	325 / 210
785	78,489	4,015	650.0	340 / 447
791	79,099	4,015	650.0	365 / 435
806	80,575	3,784	650.2	420 / 170
811	81,083	3,784	650.4	200 / 40
815	81,454	3,784	650.9	200 / 40
820	81,970	3,784	651.7	85 / 84
COLD WATER CREEK TRIBUTARY 1				
000	25	892	654.8 ⁴	160 / 45
007	696	892	660.7	110 / 8
009	900	850	660.7	50 / 90
014	1,370	841	662.5	72 / 50
017	1,679	841	662.5	90 / 20
CRANE CREEK TRIBUTARY 1				
005	475	1,837	625.7 ⁴	448 / 148
009	932	1,837	625.7 ⁴	121 / 148
014	1,409	1,776	625.7 ⁴	214 / 212
019	1,945	1,776	625.7 ⁴	254 / 182
022	2,246	1,776	625.7 ⁴	94 / 196
027	2,678	1,776	625.7 ⁴	162 / 189
032	3,218	1,755	625.7 ⁴	100 / 116
037	3,697	1,755	625.7 ⁴	153 / 150

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Cold Water Creek								
821	82,100	145	1,351	3.1	653.3	653.3	654.3	1.0
841	84,060	460	3,114	1.1	654.7	654.7	655.7	1.0
860	86,010	240	1,690	1.8	655.3	655.3	656.3	1.0
863	86,290	110	596	5.2	655.3	655.3	656.1	0.8
882	88,160	125	683	4.1	661.9	661.9	662.9	1.0
916	91,565	220	973	2.5	670.4	670.4	671.4	1.0
918	91,838	160	505	4.7	671.3	671.3	672.0	0.7
945	94,500	190 ²	542	4.2	683.0	683.0	683.0	0.0
964	96,368	120	659	3.3	692.4	629.4	693.2	0.8
989	98,935	195	324	5.3	710.8	710.8	710.8	0.0
991	99,115	160	973	1.7	714.7	714.7	715.2	0.5
1014	101,400	205	350	4.9	729.1	729.1	729.1	0.0

¹ Feet above mouth

² Value is inaccurate, as the floodway has been adjusted in this area to match topographic-based floodplain redelineation

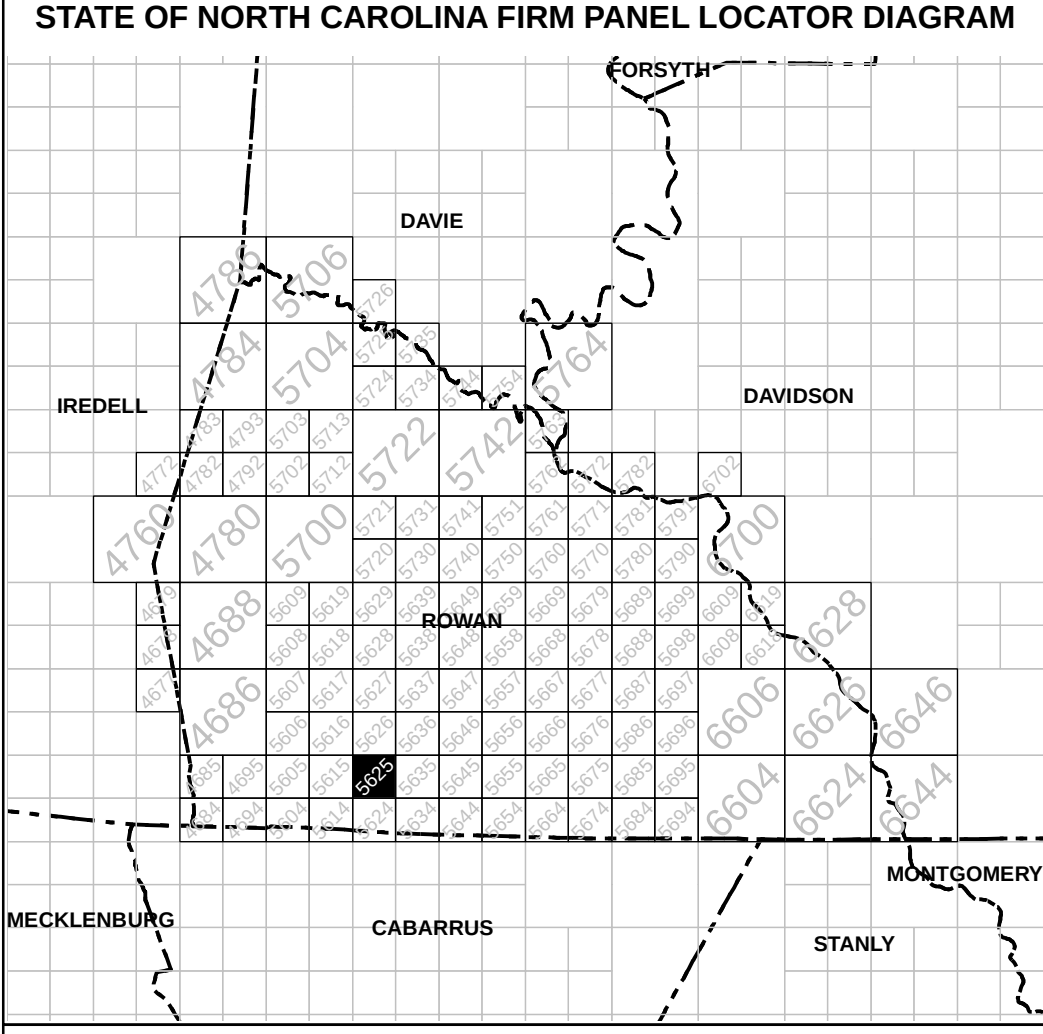
FEDERAL EMERGENCY MANAGEMENT AGENCY

ROWAN COUNTY, NC
AND INCORPORATED AREAS

TABLE 14

FLOODWAY DATA

COLD WATER CREEK



DATUM INFORMATION

The **projection** used in the preparation of this map was the North Carolina State Plane (FIPSZONE 3200). The **horizontal datum** was the North American Datum of 1983, GR580 ellipsoid. Differences in datum, ellipsoid, projection, or Universal Transverse Mercator zones used in the production of FIRMS for adjacent jurisdictions may result in slight positional differences in map features across jurisdictional boundaries. These differences do not affect the accuracy of this FIRM. All coordinates on this map are in U.S. Survey Feet, where 1 U.S. Survey Foot = 1200/3937 Meters.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. An average offset between NAVD 88 and the National Geodetic Vertical Datum of 1929 (NGVD 29) has been computed for each North Carolina county. This offset was then applied to the NGVD 29 flood elevations that were not revised during the creation of this statewide format FIRM. The offsets for each county shown on this FIRM panel are shown in the vertical datum offset table below. Where a county boundary and a flooding source with unrevised NGVD 29 flood elevations are coincident, an individual offset has been calculated and applied during the creation of this statewide format FIRM. See Section 6.1 of the accompanying Flood Insurance Study report to obtain further information on the conversion of elevations between NAVD 88 and NGVD 29. To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the North Carolina Geodetic Survey at the address shown below. You may also contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

North Carolina Geodetic Survey 121 West Jones Street Raleigh, NC 27601 (919) 733-3836 http://www.ncgs.state.nc.us	<table><tr><th>County</th><th>Vertical Datum Offset (ft)</th></tr><tr><td>Rowan</td><td>-0.7</td></tr></table> Example: NAVD 88 = NGVD 29 + (-0.7)	County	Vertical Datum Offset (ft)	Rowan	-0.7
County	Vertical Datum Offset (ft)				
Rowan	-0.7				

All streams listed in the **Flood Hazard Data Table** below were studied by detailed methods using field survey. Other flood hazard data shown on this map may have been derived using either a coastal analysis or limited detailed Riverine analysis. More information on the flooding sources studied by these analyses is contained in the Flood Insurance Study report.

FLOOD HAZARD DATA TABLE					Floodway Width (feet)
Cross Section	Stream Station ¹	Flood Discharge (cfs)	1% Annual Chance (100-year) Water-Surface Elevation (feet NAVD 88)		Left/Right Distance From the Center of Stream to Encroachment Boundary (Looking Down stream) or Total Floodway Width
BEAVER CREEK					
066	6.615	NA	697.1		85
068	6.815	NA	702.4		135 ²
100	9.970	NA	718.2		95
GRANTS CREEK					
1039	103.920	745	801.0		13 / 20
1046	104.597	493	808.9		11 / 14
1052	105.247	493	820.0		11 / 14

¹ Feet above mouth ² Value is inaccurate, as the floodway has been adjusted in this area to match topographic-based floodplain redelineation



NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data, Limited Detailed Flood Hazard Data, and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of **regulatory floodways** shown on the FIRM for flooding sources studied by detailed methods were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data for flooding sources studied by detailed methods as well as **non-encroachment widths** for flooding sources studied by limited detailed methods are provided in the Flood Insurance Study (FIS) report for this jurisdiction. The FIS report also provides instructions for determining a floodway with non-encroachment widths for flooding sources studied by limited detailed methods.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 4.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures in this jurisdiction.

Base map information and geospatial data used to develop this FIRM were obtained from various organizations, including the participating local community(ies), state and federal agencies, and/or other sources. The primary base for this FIRM is aerial imagery acquired by Rowan County. The time period of collection for the imagery is 2005. Information and geospatial data supplied by the local community(ies) that met FEMA base map specifications were considered the preferred source for development of the base map. See geospatial metadata for the associated digital FIRM for additional information about base map preparation.

Base map features shown on this map, such as **corporate limits**, are based on the most up-to-date data available at the time of publication. **Changes in the corporate limits may have occurred since this map was published.** Map users should consult the appropriate community official or website to verify current conditions of jurisdictional boundaries and base map features. This map may contain roads that were not considered in the hydraulic analysis of streams where no new hydraulic model was created during the production of this statewide format FIRM.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

If you have **questions about this map**, or questions concerning the National Flood Insurance Program in general, please call **1 - 877 - FEMA MAP** (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov>.

An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the **North Carolina Floodplain Mapping Program** website at <http://www.ncfloodmaps.com>, or contact the **FEMA Map Service Center** at 1-800-358-9616 for information on all related products associated with this FIRM. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov>.

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index or visit <http://www.ncfloodmaps.com>.

EFFECTIVE DATE OF FLOOD INSURANCE RATE MAP PANEL
NOVEMBER 5, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
JUNE 16, 2009¹

¹Updated flood hazards to reflect seamless statewide mapping

For community map revision history prior to statewide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent, the North Carolina Division of Emergency Management or the National Flood Insurance Program at the following phone numbers or websites.

NC Division of Emergency Management
(919) 715-8000 <http://www.ncdcm.com>

National Flood Insurance Program
1-800-638-6620 <http://www.fema.gov/business/nfip/>

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevation determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988

Cross section line
Transect line
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
1000-meter Universal Transverse Mercator grid ticks, zone 17
2500-foot grid values: North Carolina State Plane coordinate system (FIPSZONE 3200, State Plane NAD 83 feet)
North Carolina Geodetic Survey bench mark (for more information visit <http://www.ncgs.state.nc.us>)
National Geodetic Survey bench mark (for more information visit <http://www.ngs.noaa.gov>)
NGS-58 GPS 2-5 cm Vertical Control Marks or Contractor-Established NCMP Bench Marks (for more information visit <http://www.ncgs.state.nc.us>)
River Mile

GRID NORTH
MAP SCALE 1" = 500' (1 : 6,000)

250 0 250 500 750 1,000
150 0 150 300
FEET
METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 5625K

FIRM
FLOOD INSURANCE RATE MAP
NORTH CAROLINA

PANEL 5625
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	CID No.	PANEL	SUFFIX
CHINA GROVE, TOWN OF	370210	5625	K
KANNAPOLIS, CITY OF	370469	5625	K
LANDIS, TOWN OF	370213	5625	K
ROWAN COUNTY	370351	5625	K

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP REVISED
JUNE 16, 2009

MAP NUMBER
3710562500K

State of North Carolina
Federal Emergency Management Agency

