OFFICE ESTIMATE: _____

Project# _____
TIP# _____
Let Date _____
WBS# _____

PREDESIGN-SCOPING REPORT

E-18

County WATAUGA (DIV. 11)

Bridge# 940136
Road# AHO ROAD. SR 1353
Stream MIDDLE FORK SOUTH FORK NEW RIVER

Type Of Request: POC Force Account TIP NCMA

Date 5-23-16 Name WSH Assigned To PFF / MTS

Checked By SJS 5-25-16

Prior Survey Date NO (attach copy of prior survey) BRN. BK.: NONE CO. FILE NONE

Study By Scour Section YES COPY ATTACHED

Flood Zone AE Detail Study REDELINE Date _____ Panel# 2818 | 12/3/09

B.M. Info — NONE —

Quad Map BOONE Drainage Area 7.33 Sq Mi From DASS STA 316010300

Q25 1700 cfs Q50 2100 cfs Q100 2500 cfs Method REG. EQU. 36.153064 LAT

LONG: 81.645900 REGION 2 81.696110 LONG

LAT.: 36.153257 64590

EXISTING BRIDGE INFORMATION YEAR BUILT 1951

Location 200 FT. S JCT. US 221, 321

Average Daily Traffic 1500 2012 6% TRK

Length 46' Bed-To Crown 12 Water Depth 2'

Type Structure TIMBER FLR on I BEAMS TIMBER CAPS E. BTS, POST: SILLS

Type Spans 1 @ 45' 6"

Upstream Structure (C 341) YR. BUILT: 1971

Location US 221 0.48 M. S. JCT. 1539 3x9'x9' RCBC LONG 81.66615005

Bed-To Crown 15' (H2O 1' DEEP) Prior Survey N/A LAT 36145008

Downstream Structure (C-24) 940024 YR. BUILT: 1980

Location US 221 -0.5 M. S. JCT. SR 1540 3x11x11' RCBC L=243'

Bed-To Crown 20' (H2O 1' DEED Prior Survey N/A LONG: 81.643329

SCS Watershed N/A LAT: 36.163298

ENVIRONMENTAL TVA: NO

Trout Stream YES Anadromous Fish _____ Primary Nursery Area NO

High Quality Waters WS IV Nutrient Sensitive Waters NO

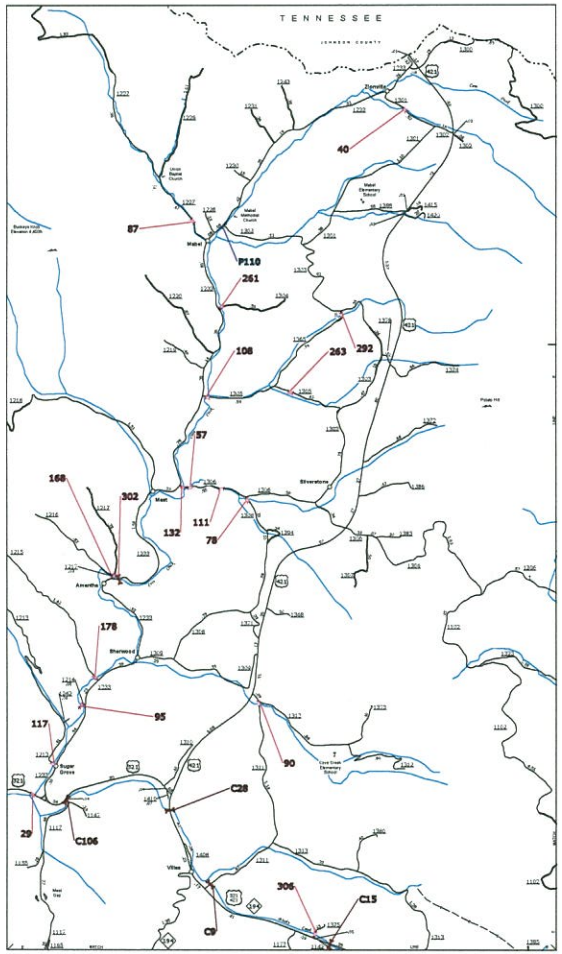
Near Water Supply Intake _____ CAMA County NO /BIMS_INDEX

Stream Classification WS IV, Tr, + STREAM #: 10-1-2-(6)-AU NUMBER *

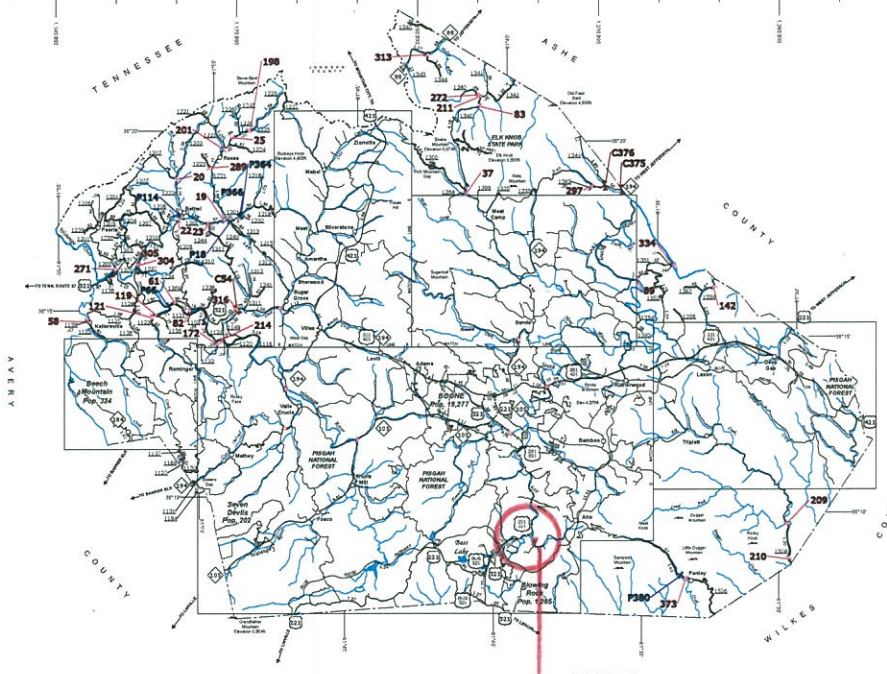
DENR River Basin Info. NEW 05-07-01-AUSUBBAS

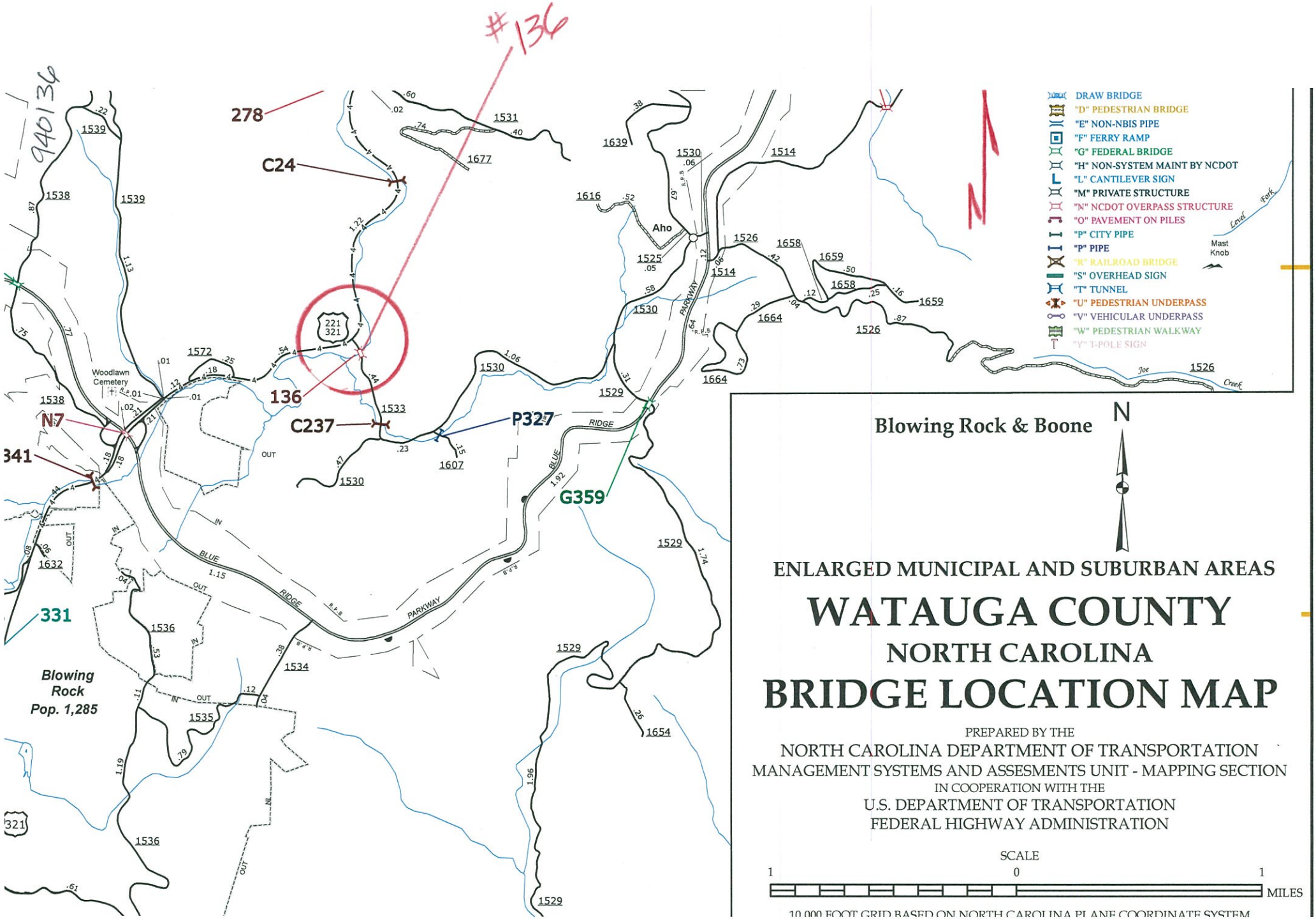
1, 24, 29, 43,

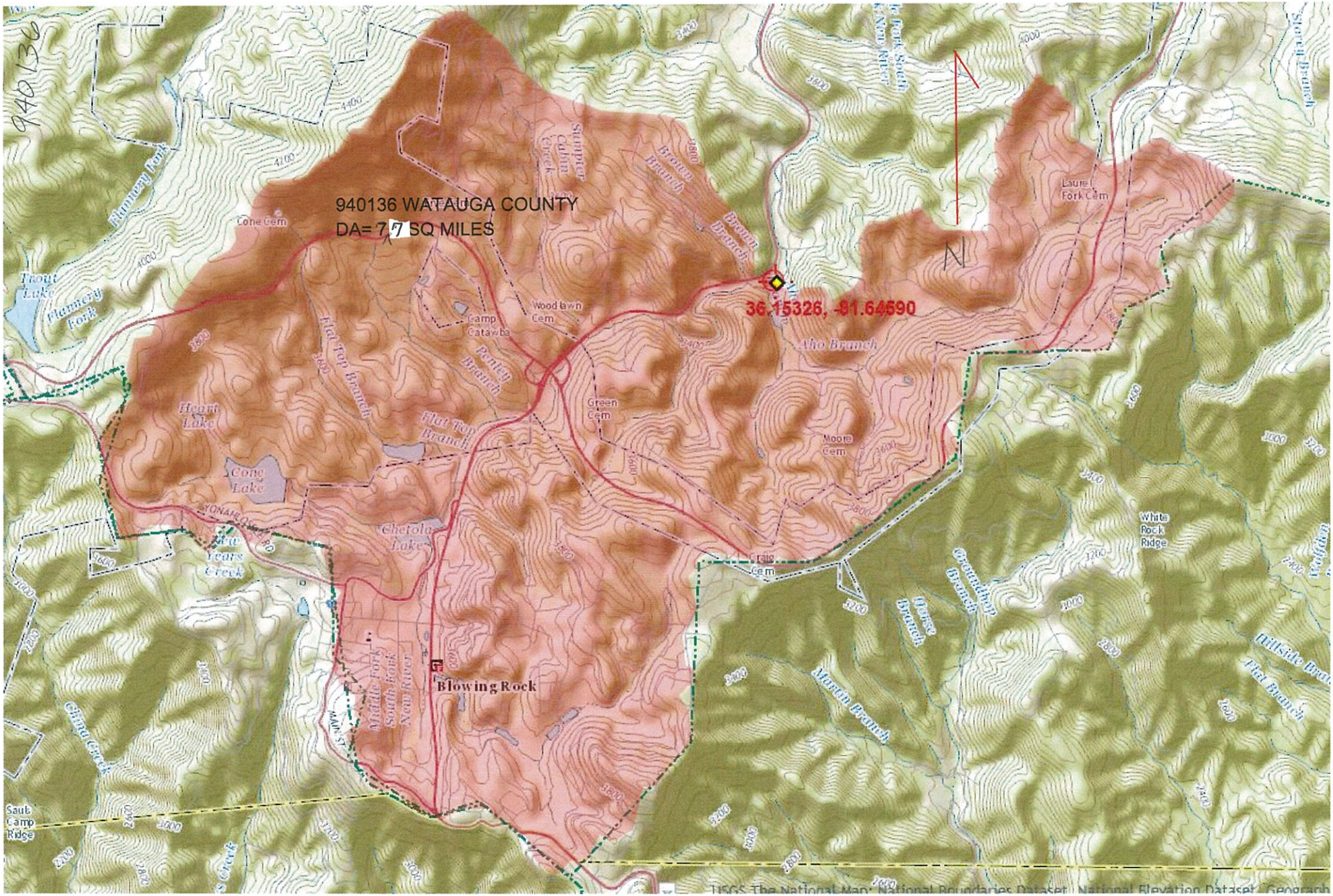
940136



Sugar Grove to Zionville and Vicinity


TENNESSEE
ASHE
AVERY
COUNTY
CALDWELL
COUNTY
WILKES
COUNTY
Beech Mountain Pop. 324
Seven Devils Pop. 202
BOONE Pop. 19,277
Blowing Rock Pop. 1,293
ELK KNOB STATE PARK
PISGAH NATIONAL FOREST
Meat Camp
Triplett
Bamboo
Sherwood
Vilas
Rominger
Valle Crucis
Mabel
Zionville
Foscoe
Blue Ridge Parkway
Elevation 5,964ft
Elevation 5,964ft
Elevation 5,964ft


#136
940136
278
C24
136
C237
P327
G359
N7
341
331
321
Blowing Rock & Boone
N
DRAW BRIDGE
"D" PEDESTRIAN BRIDGE
"E" NON-NBIS PIPE
"F" FERRY RAMP
"G" FEDERAL BRIDGE
"H" NON-SYSTEM MAINT BY NCDOT
"L" CANTILEVER SIGN
"M" PRIVATE STRUCTURE
"N" NCDOT OVERPASS STRUCTURE
"O" PAVEMENT ON PILES
"P" CITY PIPE
"P" PIPE
"R" RAILROAD BRIDGE
"S" OVERHEAD SIGN
"T" TUNNEL
"U" PEDESTRIAN UNDERPASS
"V" VEHICULAR UNDERPASS
"W" PEDESTRIAN WALKWAY
"Y" T-POLE SIGN
Aho
Woodlawn Cemetery
Blowing Rock Pop. 1,285
BLUE RIDGE PARKWAY
Mast Knob
Laurel Fork
Joe Creek
ENLARGED MUNICIPAL AND SUBURBAN AREAS
WATAUGA COUNTY
NORTH CAROLINA
BRIDGE LOCATION MAP
PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
MANAGEMENT SYSTEMS AND ASSESMENTS UNIT - MAPPING SECTION
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
1 0 1
MILES
10,000 FOOT GRID BASED ON NORTH CAROLINA PLANE COORDINATE SYSTEM


940136
940136 WATAUGA COUNTY
DA= 7.7 SQ MILES
36.15326, -81.64590
N
Trout Lake
Flannery Fork
Cone Cem
Sumpter Cabin Creek
Brown Branch
Laurel Fork Cem
Camp Catawba
Woodlawn Cem
Flat Top Branch
Penley Branch
Heart Lake
Green Cem
Moore Cem
Cone Lake
Chetola Lake
New Years Creek
Blowing Rock
Middle Fork South Fork New River
Tatum Cem
White Rock Ridge
Martin Branch
Hillside Branch
Flat Branch
Saub Camp Ridge
USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geograph

940136

StreamStats Version 3.0

Flow Statistics Ungaged Site Report

Date: Wed May 25, 2016 9:27:38 AM GMT-4
Study Area: North Carolina
NAD 1983 Latitude: 36.1531 (36 09 11)
NAD 1983 Longitude: -81.6456 (-81 38 44)
Drainage Area: 7.69 mi2

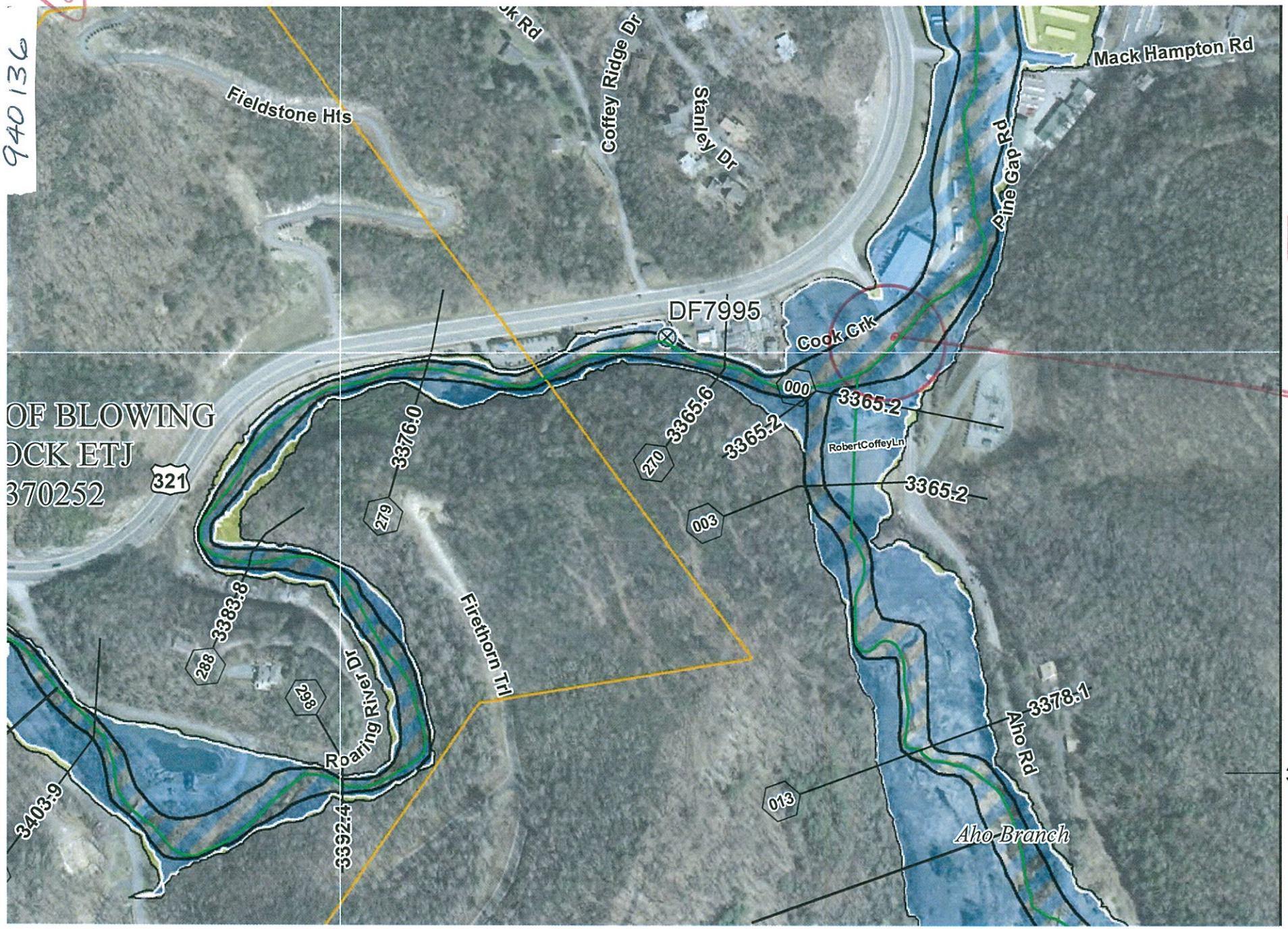
Peak Flows Region Grid Basin Characteristics			
100% Peak Southeast US over 1 sqmi 2009 5158 (7.69 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.69	1	9000
Percent Area in Region 1 (percent)	0.000	0	100
Percent Area in Region 2 (percent)	100.000	0	100
Percent Area in Region 3 (percent)	0.000	0	100
Percent Area in Region 4 (percent)	0.000	0	100
Percent Area in Region 5 (percent)	0.000	0	100

Urban Flows Region Grid Basin Characteristics			
Area in square miles=7.69			
Percent imperviousness of basin area 2006 NLCD=3.31			
Percentage of impervious area determined from NLCD 2011 impervious dataset=3.62			
100% Region 2 Urban Blue Ridge FS007-00 (7.69 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.69	0.04	41
Percent Impervious NLCD2011 (percent)	3.62	2	54.6

Peak Flows Region Grid Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	537	ft3/s	35		308	938
PK5	963	ft3/s	34		555	1670
PK10	1290	ft3/s	35		733	2290
PK25	1740	ft3/s	38		951	3200
PK50	2070	ft3/s	40		1090	3920
PK100	2460	ft3/s	42		1260	4830
PK200	2810	ft3/s	44		1380	5700
PK500	3340	ft3/s	48		1560	7130

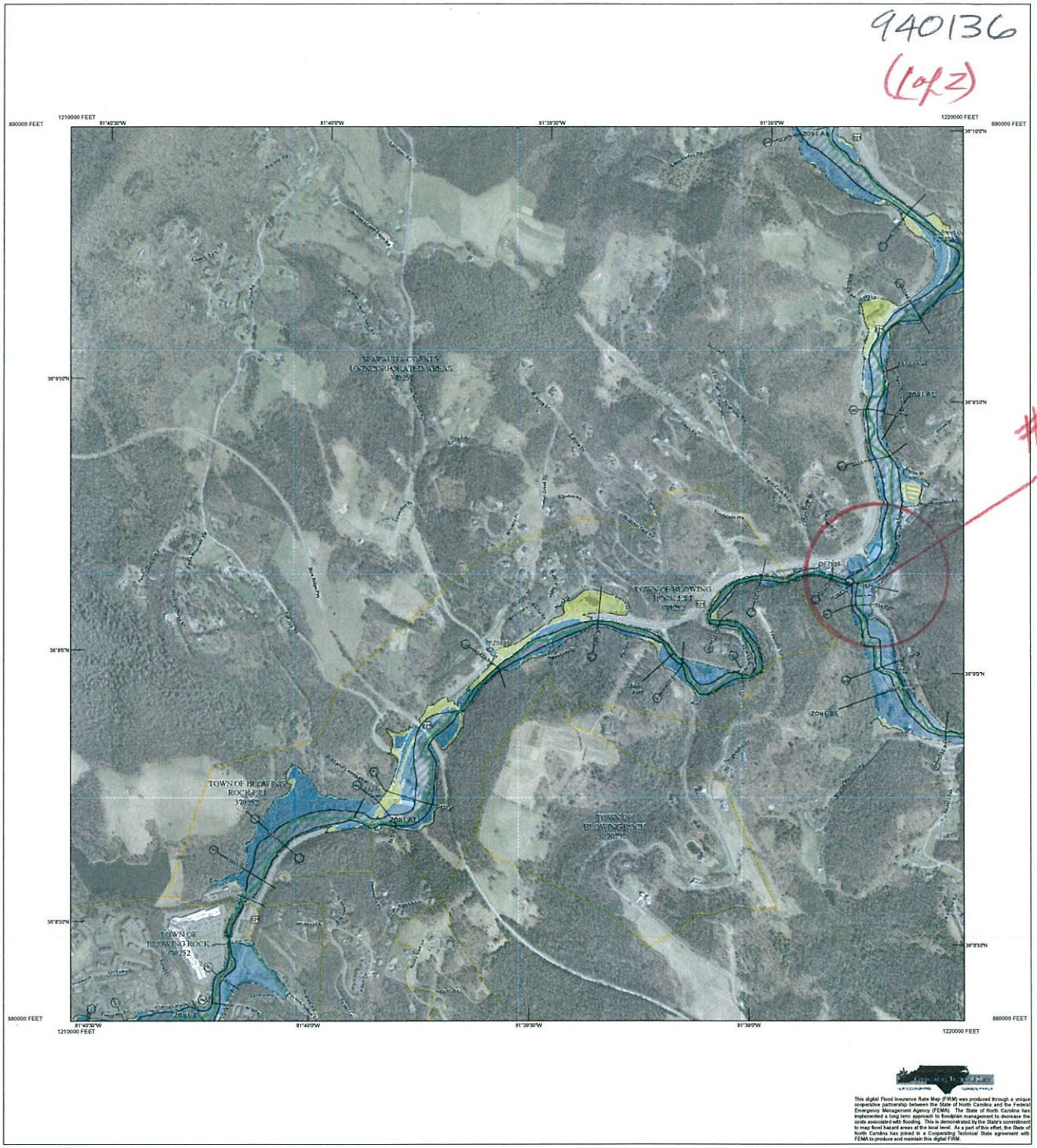
http://pubs.usgs.gov/sir/2009/5158/ (http://pubs.usgs.gov/sir/2009/5158/)
Weaver_ J.C._ Feaster_ T.D._ and Gotvald_ A.J._ 2009_ Magnitude and frequency of rural floods in the Southeastern United States_ through 2006—Volume 2_ North Carolina: U.S. Geological Survey Scientific Investigations Report 2009-5158_ 111 p.

Urban Flows Region Grid Statistics


940136
Fieldstone Hts
Coffey Ridge Dr
Stanley Dr
Mack Hampton Rd
Pine Gap Rd
DF7995
Cook Crk
000
3365.2
3365.6
3365.2
RobertCoffeyLn
3365.2
270
003
3376.0
279
OF BLOWING
OCK ETJ
370252
321
3383.8
288
298
Roaring River Dr
Firethorn Trl
3403.9
3392.4
3378.1
Aho Rd
013
Aho Branch
#136
N
36°9'0"N

940136

(1 of 2)



#136

This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT HTTP://FRIS.NC.GOV/FRIS

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes Zone X

OTHER AREAS
- Areas Determined to be Outside the 0.2% Annual Chance Floodplain Zone X

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Accredited or Provisionally Accredited Levee, Dike, or Floodwall
- Non-accredited Levee, Dike, or Floodwall
- BM5510 North Carolina Geodetic Survey bench mark
- BM5510 National Geodetic Survey bench mark
- BM5510 Contractor Est. NCFMP Survey bench mark
- 912 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- B Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

OTHER FEATURES
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.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.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the North Carolina Floodplain Mapping Program (NCFMP). The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEVEE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

PROVISIONALLY ACCREDITED LEVEE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicates the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LIMWA). The LIMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LIMWA (or between the shoreline and the LIMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Limit of Moderate Wave Action (LIMWA)

COASTAL BARRIER RESOURCES SYSTEM (CBRS) NOTE

This map may include approximate boundaries of the CBRS for informational purposes only. Flood insurance is not available within CBRS areas for structures that are newly built or substantially improved on or after the date(s) indicated on the map. For more information see http://www.fws.gov/habitatconservation/coastal_barrier.html, the FIS Report, or call the U.S. Fish and Wildlife Service Customer Service Center at 1-800-344-WILD.

CBRS Area | Otherwise Protected Area

SCALE

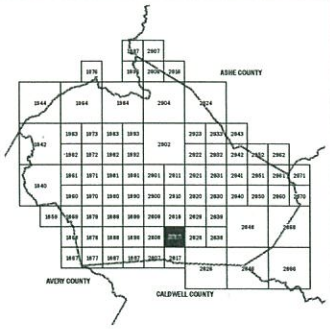
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

PANEL LOCATOR



FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 2818

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
BLOWING ROCK, TOWN OF	370252	2818	J
WATAUGA COUNTY	370251	2818	J

MAP NUMBER
3710281800J

MAP REVISED
12/3/2009

940136

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STRUCTURE MANAGEMENT UNIT

ATTENTION: PMN'S ISSUED FOR SUBSTRUCTURE, SUPERSTRUCTURE & APPROACH ROADWAY... SCOUR CRITICAL...

Structure Safety Report

Routine Element Inspection

COUNTY: WATAUGA **STRUCTURE NUMBER:** 940136 **FREQUENCY:** 24 MONTHS

FACILITY CARRIED: SR1533 **MILE POST:**

LOCATION: 200 FT.S.JCT.US221,321

FEATURE INTERSECTED: RVR.

LATITUDE: 36° 9' 11.18" **LONGITUDE:** 81° 38' 44.43"

SUPERSTRUCTURE: TIMBER FLOOR ON I-BEAMS

SUBSTRUCTURE: E.BTS:TIM.CAPS/TIM.POST&SILLS @ VAR.CTS.

SPANS: 1 @ 45'- 6"
1 @ 45'-6

☐ FRACTURE CRITICAL ☐ TEMPORARY SHORING ☑ SCOUR CRITICAL ☑ SCOUR PLAN OF ACTION

PRESENT CONDITION: Poor **INSPECTION DATE:** 08/19/2015

POSTED SV: Not Posted Not Posted **POSTED TTST:** Not Posted Not Posted

OTHER SIGNS PRESENT: (4) DELINEATORS, (2) NARROW BRIDGE



SOUTH TO NORTH

Sign noticed issued for		Number Required
NO	WEIGHT LIMIT	0
NO	DELINEATORS	0
NO	NARROW BRIDGE	0
NO	ONE LANE BRIDGE	0
NO	LOW CLEARANCE	0

INSPECTED BY	SIGNATURE	ASSISTED BY
ANDREW GLASCO	Andrew P. Glasco	MAX FORD

940136

Structure: 940136 County: WATAUGA Date: 08/19/2015 Structure Photos



ABUTMENT B



WEST PROFILE

940136

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE Run Date: 09/22/2015

COUNTY :	DIVISION :	DISTRICT:	STRUCTURE NUMBER :	LENGTH :
WATAUGA	11	2	940136	46 FEET

ROUTE CARRIED : SR1533

FEATURE INTERSECTED : MID.FORK S.FORK NEW RVR.

LOCATED : 200 FT.S.JCT.US221,321

BRIDGE NAME :

CITY :

FUNC. CLASS :	SYST.ON :	SYST.UNDER :	ADT & YR :	RAIL TYPE :
09	NFA	NFA	1500 2012	LT 323 RT 323

BUILT :	BY :	PROJ :	FED.AID PROJ :	DESIGN LOAD :
1951	BMU			Unknown

REHAB :	BY :	PROJ :	ALIGNMENT :	SKEW :	LANES :
	BMU	5.7551	TAN	90	ON 2 UNDER 0

NAVIGATION :				HT. CRN. TO BED :		WATER DEPTH :	
VC	0	FT	HC 0	FT	12 FT	2	FT

SUPERSTRUCTURE : TIMBER FLOOR ON I-BEAMS

SUBSTRUCTURE : E.BTS:TIM.CAPS/TIM.POST&SILLS @ VAR.CTS.

SPANS : 1 @ 45'-6

BEAMS OR GIRDERS : 9 LINES 24 I-BEAMS @ 2'-3.25 CTS.

FLOOR :	ENCROACHMENT :	DECK (OUT TO OUT) :
4X8 TIM/4 .5 AWS		20 FT

CLEAR ROADWAY :	BETWEEN RAILS :	SIDEWALK OR CURB :			
19.583 FT	19.583 FT	LT	0 FT	RT	0 FT

VERT.CL.OVER : 999.9 FT

INV.RTG. :	OPE.RTG. :	CONTR.MEMBER :	POSTED :				
HS-12	HS-20	InBm(# 2)Sec.Loss	SV	30	TTST	34	DATE 09/07/2015

SYSTEM : Secondary S.R. Route

GREEN LINE ROUTE : N

UNDER ROUTES AND CLEARANCES

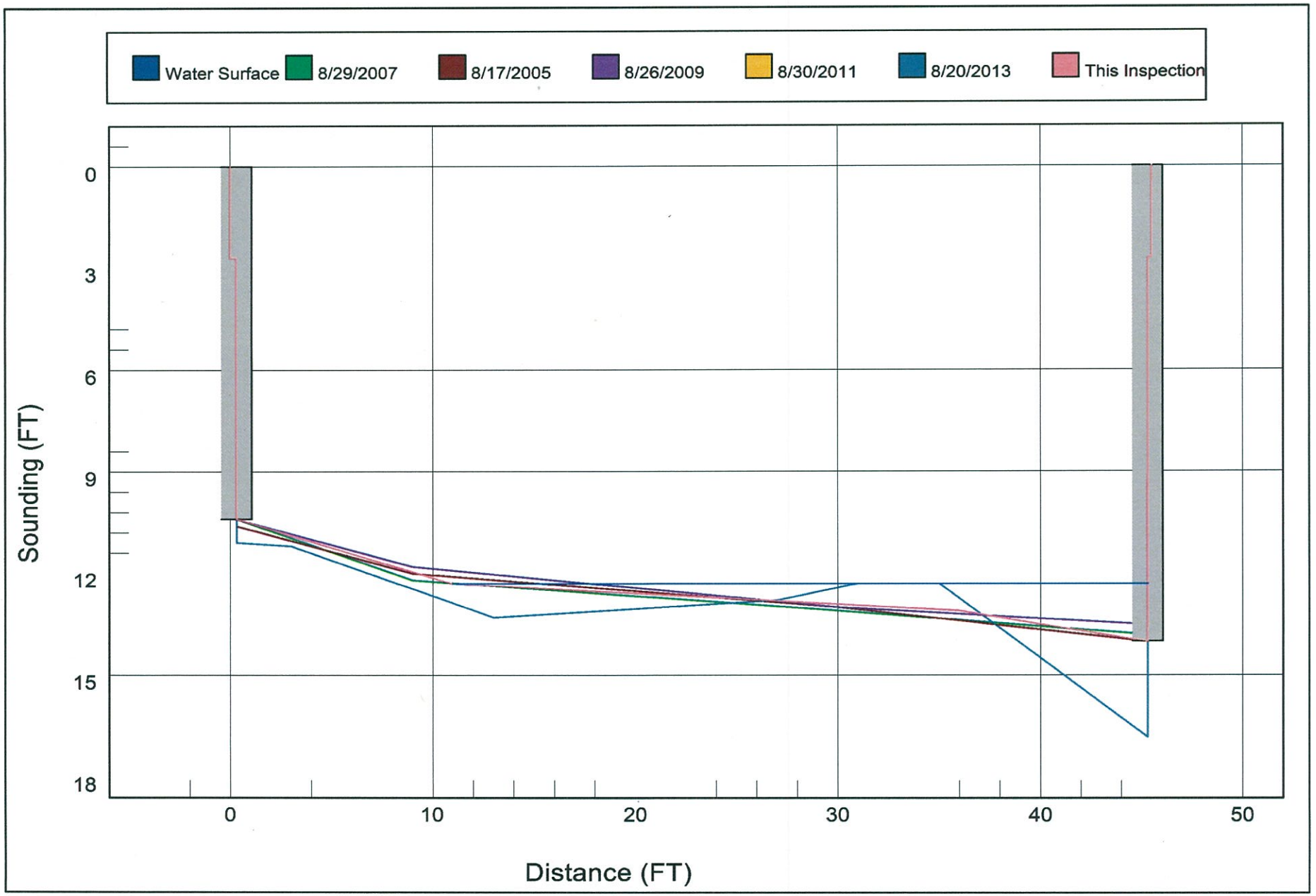
REMARKS :

940136

Bridge: 940136 County WATAUGA Date:

STREAMBED PROFILE (Downstream)

Top of Rail = 0 FT (Sounding)



940136

RECEIVED
JUL 08 2009
DIVISION OF HIGHWAYS
HYDRAULICS UNIT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

MEMORANDUM TO: D.R. Henderson, P. E.
State Hydraulics Engineer

ATTENTION TO: Jerry Beard, P. E.
Scour Program Project Engineer

FROM: for G. R. Perfetti, P. E. P.E.
State Bridge Design Engineer

DATE: July 6, 2009

SUBJECT: Crutch Bent Design for Bridge No. 136
S.R. 1533 Over Middle Fork Creek
Watauga County – Division 11
SDUC #: C90411

The Structure Design Unit has completed its design of the crutch bents at the above referenced project. The attached sheets (2) are the plan and elevation views for the crutch bents. project.

If you have any questions, or if we may be of further assistance, please contact Anupam Shah, P. E. or Farzin Asefnia, P. E. at (919) 250-4047.

GRP/ADS/kmb

Attachment: "Crutch Bents for Bridge No. 136 – Plan and Elevation Views For Bridge" (2 sheets)

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
STRUCTURE DESIGN
1581 MAIL SERVICE CENTER
RALEIGH NC 27699-1581

TELEPHONE: 919-250-4037
FAX: 919-250-4082

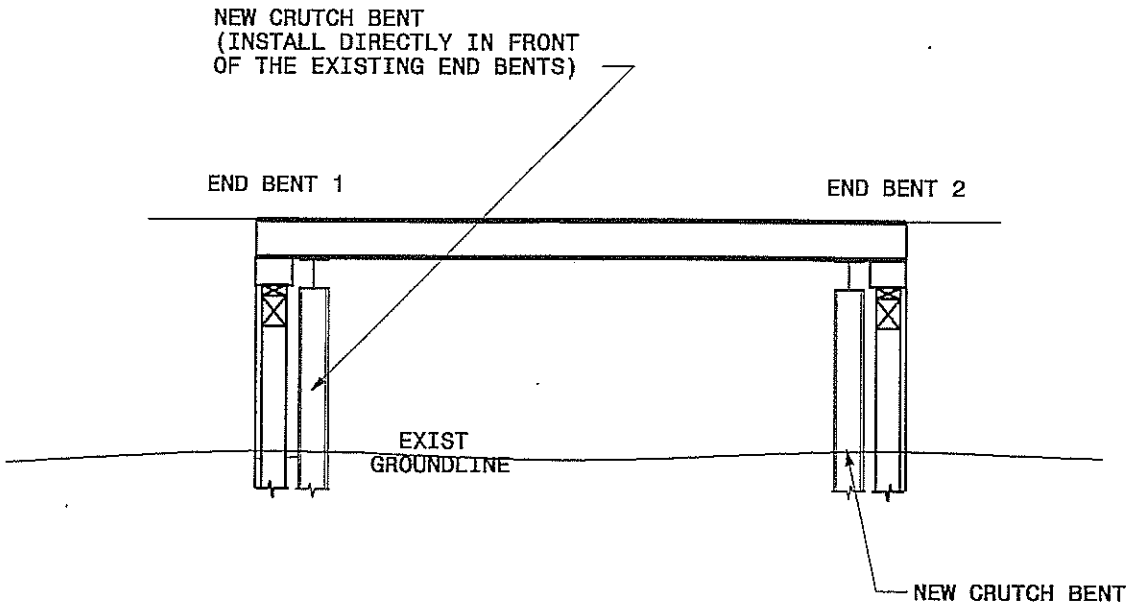
WEBSITE: WWW.NCDOT.ORG

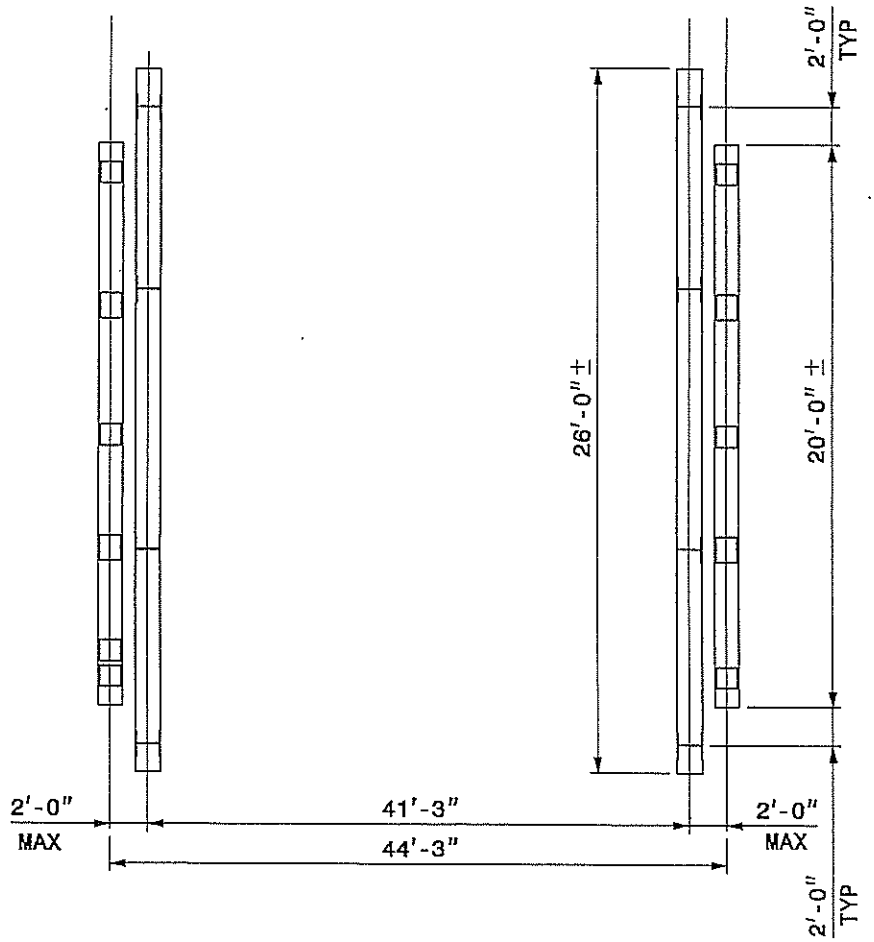
LOCATION:
CENTURY CENTER COMPLEX
BUILDING A
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

940136

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HIGHWAY BUILDING
P. O. BOX 25201
RALEIGH, NORTH CAROLINA 27611

SUBJECT CRUTCH BENTS FOR BRIDGE NO. 136 -- PROJECT SDUC PROJ #: C90411
PLAN AND ELEVATION VIEWS FOR BRIDGE WATAUGA COUNTY
PREPARED BY ADS DATE 06/09 STATION
CHECKED BY TMS DATE 06/09 STR NO SHEET 1 OF 2



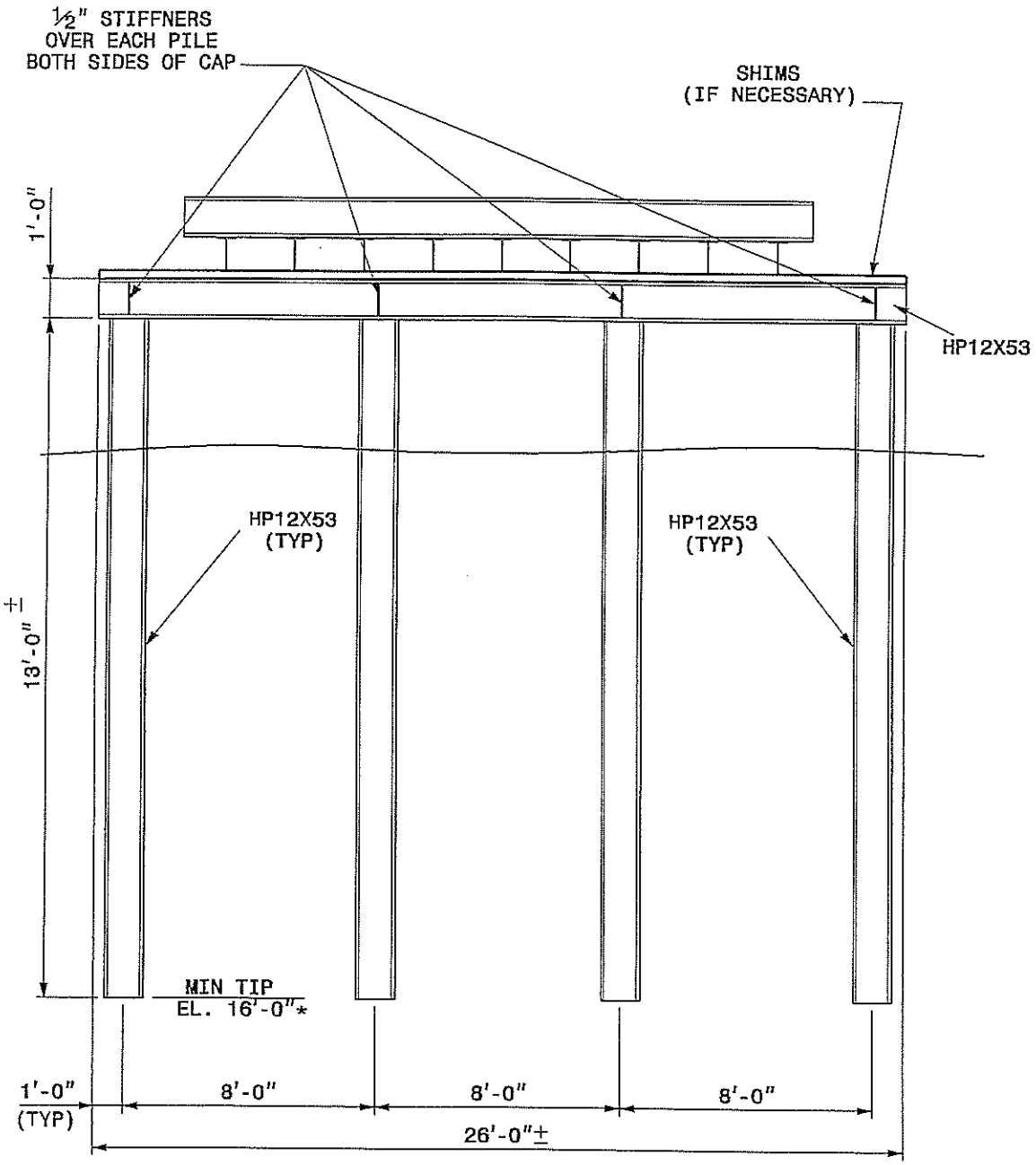


06-JUL-2009 10:47
s:\pg2\squad_c\letters\nupe\09_projects\c9041l - sr 1533 over middle fork creek - cruch bent\c9041lmiddle fork creek.dgn
dshan

940136

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HIGHWAY BUILDING
P. O. BOX 25201
RALEIGH, NORTH CAROLINA 27611

SUBJECT CRUTCH BENTS FOR BRIDGE NO. 136 -- TYPICAL SECTION FOR CRUTCH BENT
PROJECT SDUC PROJ *: C90411
WATAUGA COUNTY
PREPARED BY ADS DATE 06/09
STATION
CHECKED BY TMS DATE 06/09
STR NO SHEET 2 OF 2



TYPICAL SECTION

NTS

* - TOP OF RAIL
EL. 0'-0"

NOTE: THE PILES FOR THE CRUTCH BENT AT END BENTS 1 AND 2 SHALL BE DRIVEN TO THE MINIMUM TIP ELEVATION INDICATED AND A MINIMUM BEARING CAPACITY OF 45 TONS EACH.

06-JUL-2009 10:48
s:\pg2\squad.c\letters\rupe\09_projects\c9041l - sr 1533 over middle fork creek - cruch bent\c9041l middle fork creek.dgn
ashah

c:\scour\forms\brscrpt.doc

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

NCDOT UNITS:
BRIDGE MAINTENANCE UNIT
HYDRAULIC DESIGN UNIT
GEOTECHNICAL UNIT
STRUCTURE DESIGN UNIT
SOILS AND FOUNDATION SECTION

BRIDGE SCOUR REPORT

COUNTY: WATAUGA BRIDGE: 136 ROUTE: SR 1533 STREAM CROSSED: MIDDLE FORK CK

ASSESSMENT YES EVALUATION ____ BY: JJB DATE 2/20/2009

FHWA STRUCTURE INVENTORY & APPRAISAL CODES:

SUBSTRUCTURE CONDITION (ITEM 60)
CHANNEL AND CHANNEL PROTECTION (ITEM 61)
WATERWAY ADEQUACY (ITEM 71)
SCOUR CRITICAL BRIDGES ((ITEM 113)

MONITORING:

PLAN REQUIRED? YES _____ NO _____

FLOOD MONITORING EVENT : (UPSTREAM FACE, FROM TOP OF RAIL):

REQUIRED ACTION:

CRITICAL MONITORING DEPTH (UPSTREAM FACE, FROM TOP OF RAIL):

REQUIRED ACTION:

CRITICAL HIGH WATER DEPTH (UPSTREAM FACE, FROM TOP OF RAIL):

REQUIRED ACTION:

SCOUR CRITICAL DEPTHS(UPSTREAM FACE, FROM TOP OF RAIL):

REQUIRED ACTION:

INCREASE UNDERWATER INSPECTION CYCLE? YES ☐ NO ☑ FREQUENCY _____

COUNTERMEASURES:

PLAN REQUIRED? YES ☑ NO ☐

SUMMARY OF PLAN:
Provide crutch bents @ EB1 & EB2 using HP 12x53 piles driven to 16' below top of rail or refusal

Code bridge 7 after crutch bents are added.

CONSTRUCTION COMPLETED DATE _____

FINAL CODING AFTER WORK IS COMPLETED (ITEM 113) _____ DATE _____

BRIDGE MAINTENANCE COMMENTS:
EB1 is supported on a timber sill on 18,11,26 blow material with harder material located 2' below sill

EB2 is supported on a timber sill on 28,51.25 blow material with harder material located 3' below sill
Plans attached.

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BRIDGE SCOUR EVALUATION

2

ASSESSMENT AND DATA SUMMARY REPORT

ASSESSED 2/20/2009
BY: JJB
CODE 3
CLASSIFIED Scour Critical

SITE IDENTIFICATION

COUNTY WATAUGA CITY/ TOWN _____ BRIDGE NO. 136
ROUTE SR 1533 STREAM MIDDLE FORK CK ROAD MILE _____
DUAL BRIDGE NO. ____ IS US / DS
ORIG. PROJECT NO. _____ YEAR BUILT 1951
REHAB. PROJECT NO. _____ YEAR REHAB. _____
CURRENT ADT 1800 YEAR 2002 FUTURE ADT _____ YEAR _____

INFORMATION RESOURCES AVAILABLE:

HYDRAULIC STUDY REPORT (DATE)
AS-BUILT CONSTRUCTION PLANS (DATE)
FOUNDATION REPORT (DATE)
OTHER AGENCY STUDIES (DATE)
(FEMA, CORPS, T.V.A., SCS)
QUAD MAPS (NAME & DATE)
AERIAL PHOTOGRAPHY (DATE)
GAGE DATA (TYPE, NO., DRAINAGE AREA)
DISTANCE TO SITE (UP / DN STREAM)
BRIDGE INSPECTION REPORT (DATE) 8/2005
UNDERWATER INSPECTION (DATE, CYCLE)
STRUCTURE DATA FILE (DATE)

HYDRAULIC DATA:

DRAINAGE AREA _____ SQ. MI. SOURCE _____
100 YR. WATERWAY OPENING (NORMAL TO FLOW) _____ SQ. FT.

HISTORICAL FLOODS

DATE	ELEV. (FT.)	APPROX. FREQ. (YRS.)	APPROX. DISCH.	ADJUSTED TO SITE
Sept.. 2004	below deck			

SOURCE Ivan Dishman-NCDOT

	Q ____	Q ____	Q ____	Q ____
FLOOD FREQUENCY (YRS.)				
ELEVATION (FT.)				
DISCHARGE (CFS)				
AVG. VELOCITY (Q/A)				

SOURCE: _____

COMMENTS: _____

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STRUCTURE DATA

BRIDGE LENGTH: 46
SUFFICIENCY RATING: 73.8
NO. OF SPANS: 1
BED TO CROWN 12.0

EST. REMAINING LIFE YRS _____ DATE: 2/20/2009
SPAN LENGTHS 1@ 45.5
SIMPLE OR CONTINUOUS _____
TOP OF RAIL ELEV. 0 [DISTANCES ARE MEASURED DOWN]
THALWEG ELEVATION 13.5

BENT NO. [W-E], [S-N]		EB1	1B2				
TYPE:		TIMBER	TIMBER				
SKEW:		STRAIGHT	STRAIGHT				
FTG./FOUNDATIN TYPE:		TIM. SILL	TIM. SILL				
FOOTING THICKNESS		0.8	0.8				
TOP FTG. ELEV	LT						
	CTR						
	RT						
BOT FTG ELEV	LT						
	CTR						
	RT						
TOP SILL ELEV	LT						
	CTR	12.6	12.7				
	RT						
BOT SILL ELEV	LT						
	CTR	13.4	13.5				
	RT						
CONC./ RIP RAP PROTECTION							
PILE TYPE							
PILE LENGTH [AVERAGE]							
PILE TIP ELEV. [AVERAGE]							
PILE EMBED BELOW THALWEG							
FTG. EMBED. BELOW THALWEG		0.1 above	@ thalweg				

COMMENTS: _____

GEOMORPHIC DATA: (LOOKING DOWNSTREAM)

CHANNEL (NORMAL TO FLOW):
AVG. BASE WIDTH___ AVG. TOP WIDTH_____ AVG. DEPTH_____

AT CROSSING: STRAIGHT ✓ MILD CURVE SHARP BEND

FLOW ANGLE OF APPROACH: LOW_____ (0°-5°) MILD_____ (5°-20°) HIGH _____ (20°+)

CROSSING WIDTH COMPARED TO:
UPSTREAM: WIDER_____ SAME NARROWER
DOWNSTREAM: WIDER_____ SAME NARROWER

BASED ON COMPARISON OF SECTIONS TAKEN AT DATES _____
CHANNEL HAS: WIDENED _____ FT. SAME_____ NARROWED _____FT.
AGGRADATED _____ FT. SAME_____ DEGRADATED _____FT.
SHIFTED LT. _____ FT. SAME_____ SHIFTED RT. _____FT.
THALWEG HAS: SHIFTED LT. _____ FT. SAME_____ SHIFTED RT. _____FT.

REPORTED SITE SCOUR PROBLEM:

	MINOR	MODERATE	SEVERE	UNKNOWN
LT. BANK				
RT. BANK				
LT. SPILL SLOPE				
RT. SPILL SLOPE				
PIER (S)				
DEBRIS	✓			
CHANNEL BED				
OTHER _____				

IS REPORTED PROBLEM CHANNEL FLOW ASSOCIATED? N/A

BASED ON THE AVAILABLE GEOMORPHIC DATA, THE CHANNEL STABILITY POTENTIAL OVER THE LIFETIME OF THE EXISTING STRUCTURE CAN BEST BE DESCRIBED AS:

1) RELATIVELY STABLE WITH LITTLE EXPECTED CHANGE. NO

2) POTENTIAL FOR SLOW CHANGE OVER TIME. NOT PRONE TO A MAJOR ONE-EVENT CHANGE. N/A

3) UNSTABLE. SUBJECT TO RAPID EVOLUTIONARY CHANGE. YES

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ASSESSMENT DATA

County: WATAUGA
Bridge No: 136

Assessment Date: 2/20/2009

	YES or No
INSPECTION REPORTS:	
DATE OF INSPECTION REPORT 8/2005	
EXISTING SCOUR HOLES PRESENT	N
UNDERMINING OF FOOTINGS	N/A
72 FIELD SCOUR EVALUATION-SCOUR HAS OCCURRED	N/A
HYDRAULIC DATA:	
HIGH WATER-OVERTOP BRIDGE DECK	N/A
CHANNEL SHIFTING OR DEGRADING	N/A
STREAM CONTRACTED AT BRIDGE-NO RELIEF	N/A
BAD ANGLE OF ATTACK-STREAM CURVES AT BRIDGE	N/A
DEBRIS PROBLEM @ BRIDGE-LEANING TREES ON BANK	Y
GEOTECHNICAL DATA:	
FOUNDATION MATERIAL IS SCOURABLE	Y
STREAMBED IS SAND W/ NO ARMOR MATERIAL	Y
STRUCTURAL DATA:	
SMALL ABUTMENTS (NOT MASSIVE) -EASY TO DAMAGE	Y
WIDE WEBS-ADVERSE ANGLE-CREATES PIER SCOUR	N/A
ROTATION OR SETTLEMENT OF PIERS OR ABUTMENTS	N/A
ADDITIONAL CONSIDERATIONS:	
DAM-UPSTREAM / DOWNSTREAM	N/A
PREVIOUS COUNTERMEASURES DAMAGED	N/A
RIP RAP ERODED	N/A
SAND OR GRAVEL MINING IN VICINITY OF BRIDGE	N/A

This assessment was conducted by an interdisciplinary team of Hydraulic, Geotechnical ,Structural, Bridge Maintenance, and FHWA Engineers based upon information provided and engineering judgment.

NOTE:
Bridge Inspectors to notify the Hydraulics Unit if any of the above conditions change enough to warrant recoding of Item 113.

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DECISION:

CLASSIFIED AS:

SCOUR CRITICAL	✓
UNKNOWN FOUNDATION	
LOW RISK	

RECOMMENDED SCOUR CODE 3

ASSESSMENT COMMENTS: EB1-Timber sill @ 13.4' below Top of Rail on 18,11,& 26 blow material.
EB2- Timber sill @ 13.5' below TOR on 28,51,& 25 blow material.

SCHEDULE FOR DETAILED STUDY

SCHEDULE FOR FURTHER IN-HOUSE STUDY

ASSESSED BY: JJB
FIRM: NCDOT
DATE: 2/20/2009
CHECKED BY:
FIRM:
DATE:

APPROVED BY: JLL
DATE: 2/20/2009

FINAL COMMENTS : Scour Committee recommends code 3.
Bridge on timber sills on scourable material. Countermeasure-add crutch bent @ EB1 & EB2.
See Report by FDH dated March 24, 2009.
See attached crutch bent plans.

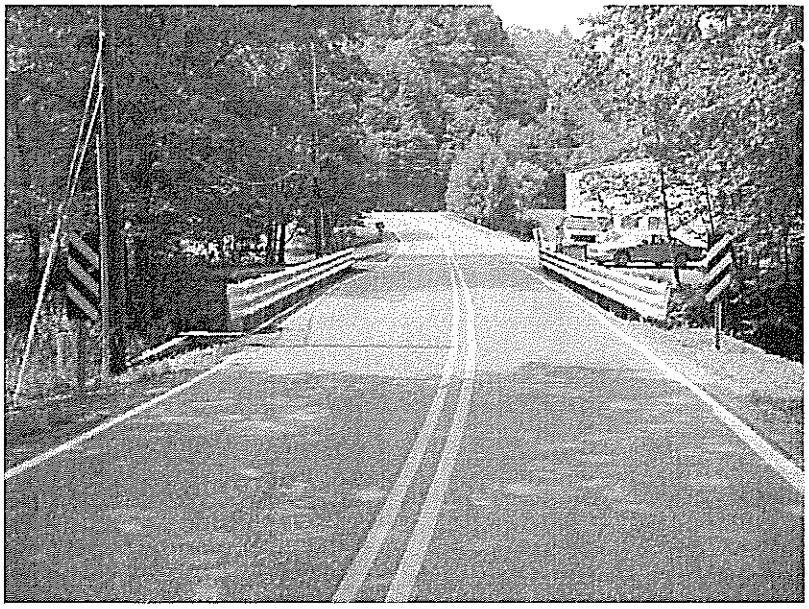
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NCDOT - HYDRAULICS DEPT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

Unknown Foundation Determination

Substructure Report

Watauga 940136
SR 1533 over Middle Fork Creek



FDH Project # 08-06077E

Submitted by:

J. Darrin Holt, Ph.D., P.E.
President

FDH Engineering, Inc.
2730 Rowland Rd., Raleigh, NC 27615
T: (919) 755-1012 F: (919) 755-1031
www.fdh-inc.com
holt@fdh-inc.com

March 24, 2009

Report Submitted to: Mr. Jerry Beard. PE
NCDOT Hydraulics Unit
1590 Mail Service Station
Raleigh, NC 27695-1590

Facility Carried: SR 1533

Feature: Over Middle Fork Creek

Substructure Type: E.BTS.: Timber Caps/Timber Post and Sills @ VAR.CTS.

No. of Interior Bents: Zero (0)

Piles per Bent: NA

Reference Document(s): Bridge Inspection Report and Structure Data Report from August 2005 found.

Comments: No noticeable scouring has occurred at time of testing.

Field Work Performed:

- Sounding rods were driven next to EB1 and EB2 to determine the depth to high blow count material.

Bridge Information From August 2005 Inspection Report:

Substructure Condition: 6
Channel and Channel Protection: 7
Waterway Adequacy: 7
Bridge Length: 46.0'
Sufficiency Rating: 73.8
Number of Spans: 1 Span Lengths: 45'-6
Underclearance: 7'-7
List of Scour Problems and Repairs: NA
Original Construction: 1951 Year Reconstructed: 0000
Current ADT: 001800 Year: 2002
Crown to Bed: 12'-0

Summary of Findings:

Hydraulic Data: From Ivan Dishman

Maintenance Personal :

Reference to top rail: below deck
Date of high water: Sept 2004
Does bridge overtop during minor floods (<10 year event): No

Requiring closure and inspection before reopening? No

Reported of apparent scour problem? No

List any major events: Hurricanes or storms and year of event and high water (reference to TOR)
Hurricane Hugo 1989, Hurricane Dennis 1999, Hurricane Isabel 2003, Hurricane Ivan 2004.

Field Observations:

Any Scouring Noted: No
Angle of Stream Attack: Straight
Debris: Large Trees Leaning on Bank? Yes
Debris Piled up on Bents? No
Has Thalweg Shifted? No

Field Testing Results:

TABLE ½" ROD DRIVES					
EB1 (BC1)		EB1 (BC2)		EB1 (BC3)	
DEPTH FROM TOP OF RAIL	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT
*13.4'-14.4'	18	11.8'-12.8'	1	10.5'-11.5'	1
14.4'-15.0'	100/7"	*12.8'-13.8'	11	11.5'-12.5'	1
-	-	13.8'-14.0'	100/3"	*12.5'-13.5'	26
-	-	-	-	13.5'-14.5'	43
-	-	-	-	14.5'-14.6'	100/2"

TABLE ½" ROD DRIVES					
EB2 (BC4)		EB2 (BC5)		EB2 (BC6)	
DEPTH FROM TOP OF RAIL	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT
10.2'-11.2'	6	12.3'-13.3'	35	*12.9'-13.9'	25
11.2'-12.2'	30	*13.3'-14.3'	51	13.9'-14.9'	55
12.2'-13.2'	65	14.3'-14.6'	100/4"	14.9'-15.9'	130
*13.2'-14.2'	28	-	-	15.9'-16.3'	100/5"
14.2'-15.2'	35	-	-	-	-
15.2'-16.2'	90	-	-	-	-
16.2'-17.1'	200/11"	-	-	-	-

* indicates bottom of footer at location of blow count

Sounding Rods:

Sounding rods were driven at EB1 and EB2.

Conclusions

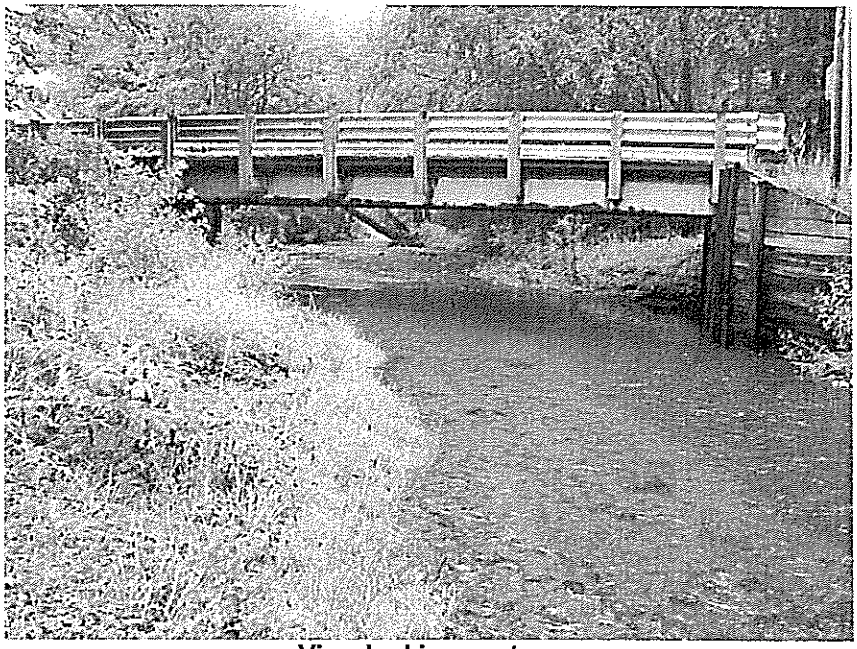
Foundation consists of timber sills. EB1 is 13.4 ft and EB2 2 is 13.5 ft from top of rail to bottom of timber sill. Sounding data indicates EB1 footing is resting on material of 18 BPF at BC1, 11 BPF at BC2 and 26 BPF at BC3. Sounding data indicates EB2 footing is resting on material of 28 BPF at BC4, 51 BPF at BC5 and 25 BPF at BC6.

BOTTOM OF FOOTING			
Pile and Footing Location	**Test Method**	**Top of Rail to Bottom of Footing (FT)**	**Embedment Below Thalweg (FT)**
EB1	**ROD**	**13.4**	**0.1 above thalweg**
EB2	**ROD**	**13.5**	**0.0**

Sounding Rods

Sounding rods driven at a site are ½" in diameter and vary in segment length from 5 ft to 10 ft. Coupling devices are used for extending the rods to depths greater than the individual rod lengths. The driving head weighs 16 lbs. Determining blow counts involves dropping the 16 lb hammer with a 2 foot drop and counting the actual number of blows required to drive the rod 1 ft into the material.

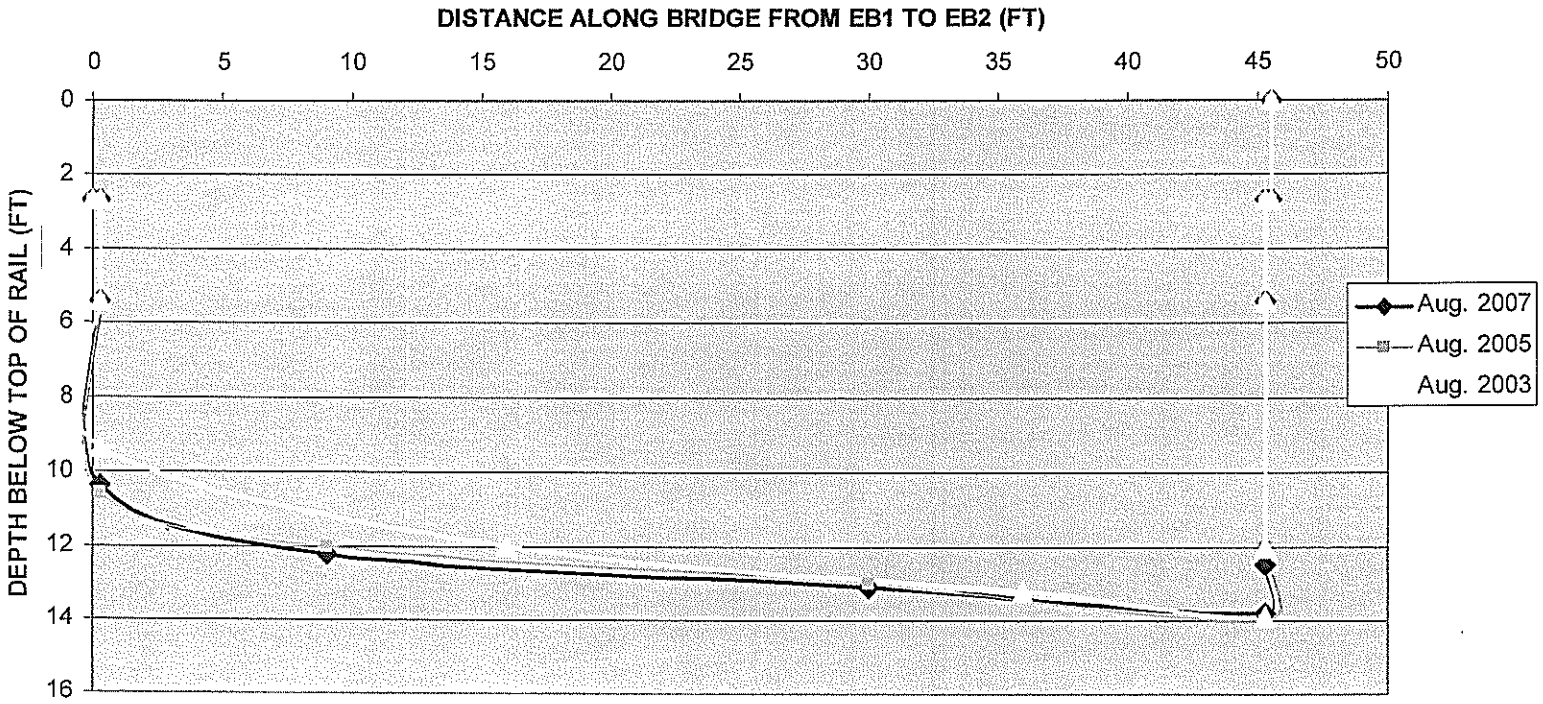
Professional judgments are incorporated into this report. These are based on our evaluations of field information gathered, on our understanding of the characteristics of the project, and on our experience and capabilities with the topic of unknown foundations. We guarantee only that our work and judgments rendered meet the standard of care of our profession.



View looking upstream.

940136

DOWN STREAM BED SOUNDINGS



FDH Engineering, Inc. 2730 Rowland Rd., Raleigh, NC 27615 T: (919) 755-1012 F: (919) 755-1031

(2 of 2)

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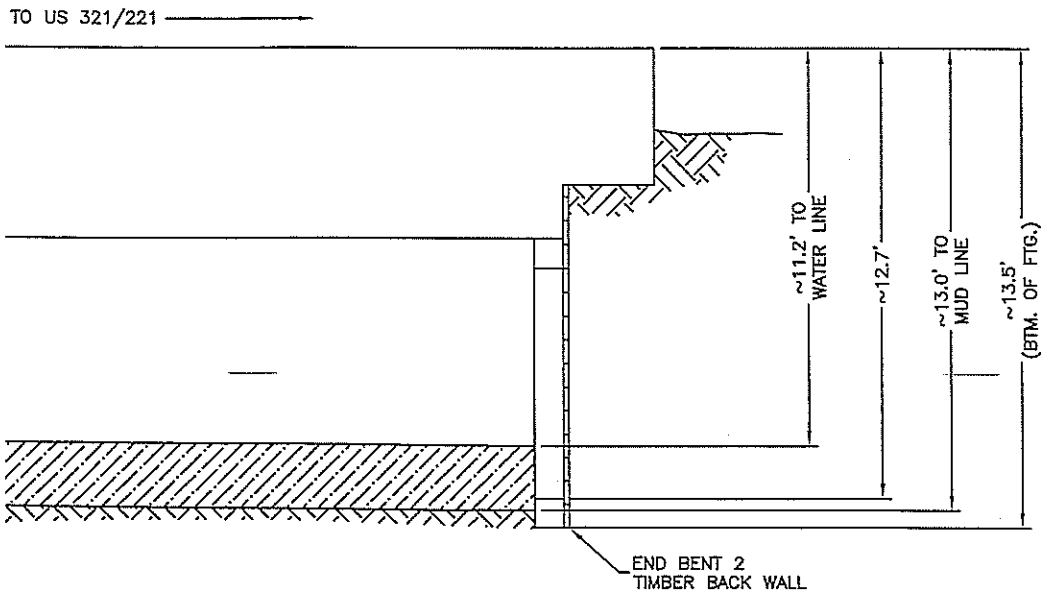
BLOW COUNT CHART

BC1		BC2		BC3		BC4		BC5		BC6	
	BPF	DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF
4'	18	11.8'-12.8'	1	10.5'-11.5'	1	10.2'-11.2'	6	12.3'-13.3'	35	*12.9'-13.9'	25
0'	100/7"	*12.8'-13.8'	11	11.5'-12.5'	1	11.2'-12.2'	30	*13.3'-14.3'	51	13.9'-14.9'	55
		13.8'-14.0'	100/3"	*12.5'-13.5'	26	12.2'-13.2'	65	14.3'-14.6'	100/4"	14.9'-15.9'	130
				13.5'-14.5'	43	*13.2'-14.2'	28			15.9'-16.3'	100/5"
				14.5'-14.6'	100/2"	14.2'-15.2'	35				
						15.2'-16.2'	90				
						16.2'-17.1'	200/11"				

* INDICATES BOTTOM OF FOOTER AT LOCATION OF BLOW COUNT







Prepared for:
NCDOT - HYDRAULICS DEPT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27699-1590

Prepared by:
FDH ENGINEERING
2730 ROWLAND DRIVE
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PHONE (919) 755-1012
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NORTH CAROLINA PROFESSIONAL SEAL 022498 ENGINEER J. DARRIN HOLT

SITE ID:	#940136
DRAWN BY:	CDJ
CHECKED BY:	JDH
JOB NO:	08-06077E

SUBMITTALS		
DATE	DESCRIPTION	REV
03/24/09		A

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WATAUGA 136

SITE NUMBER:
#940136

SITE ADDRESS:
SR 1533
WATAUGA COUNTY

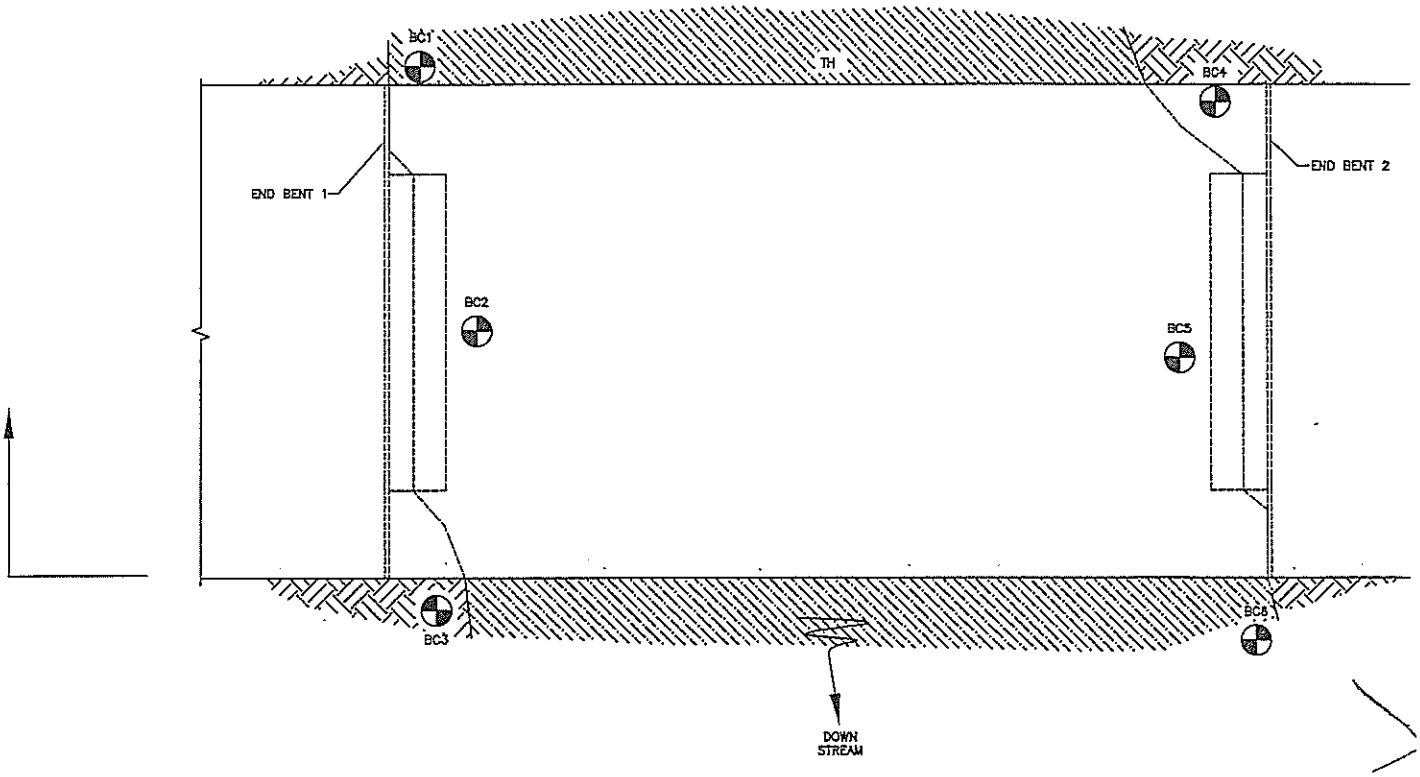
SHEET TITLE
FOUNDATION PLANS

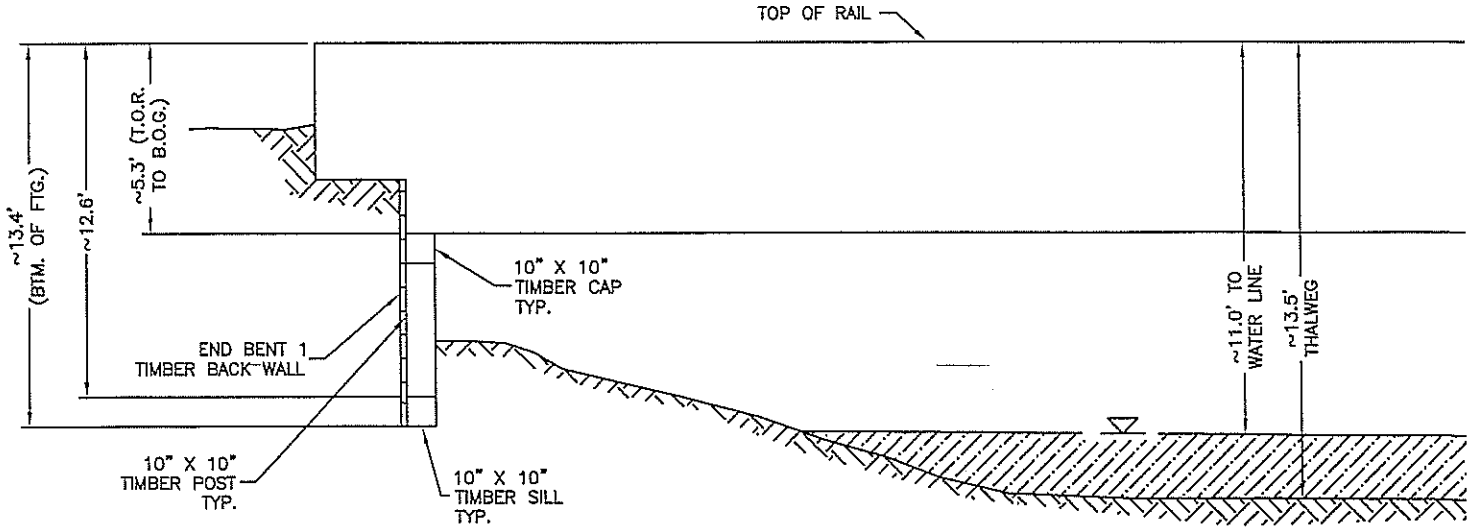
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940136

FOUNDATION PLAN
NTS







ELEVATION
NTS