OFFICE ESTIMATE: _____

Project# _____
TIP# B-5844
Let Date _____
WBS# 45797.1.1

PREDESIGN-PRESURVEY REPORT

County CLEVELAND (DIV. 12)

Bridge# 220067
Road# SR 2245 (BETHLEHEM RD)
Stream BEASON CREEK

Type Of Request: POC Force Account TIP NCMA

Date 1-29-16 Name QTN Assigned To PFF / MTS
Checked By WSH 2-5-16
Prior Survey Date 9-9-80 (attach copy of prior survey) BRN. BK.: 3@25' YES CO. FILE NONE
Study By Scour Section -206 REPORT ATTACHED
Flood Zone AE Detail Study LIMITED Date _____ Panel# 2574 ✓
B.M. Info N/A 7.95 SQ. M. DASS STATION: 215334403
Quad Map GROVER ✓ Drainage Area 7.85 SQ M From STREAMSTATS
Q25 1870 CFS Q50 2270 CFS Q100 2640 CFS Method REG. EQU. REG. 1
LONG: 81.431939
LAT: 35.233358

EXISTING BRIDGE INFORMATION

Location 0.2M N. JCT SR 2247
Average Daily Traffic 1800 YR. 2012 (6% TRK) YR. BUILT: 1951
Length 76' Bed- To Crown 15' Water Depth 1'
Type Structure TIMBER DECK ON I-BEAMS, EBTs & BTs TIMBER CAPS / PILES
Type Spans 1@25'-0", 2@25'-4"
Upstream Structure 220065 / PRECAST PREST. CONC. CHANNELS, EBTs & BTs = P.P.C. CAPS ON TIMBER
Location 0.4M E JCT SR 2245 PILES, CONC. 1@30'-3", 1@30'-0", 1@30'-3"
Bed- To Crown 18' (1' DEPTH) Prior Survey N/A YR. BUILT: 1976
Downstream Structure 220069 / DBL TIMBER DECK ON T-BEAMS LONG: 81.412844
Location 0.7M S JCT SR 2243 EBT & BT: REINF. CONC. STEEL PILE LAT: 35.231322
Bed- To Crown 17' (1' DEPTH) Prior Survey N/A 1@46'-7.5", 1@43'-9", 1@46'-7.5" LONG: 81.447769
SCS Watershed N/A LAT: 35.229022

ENVIRONMENTAL TVA: YES

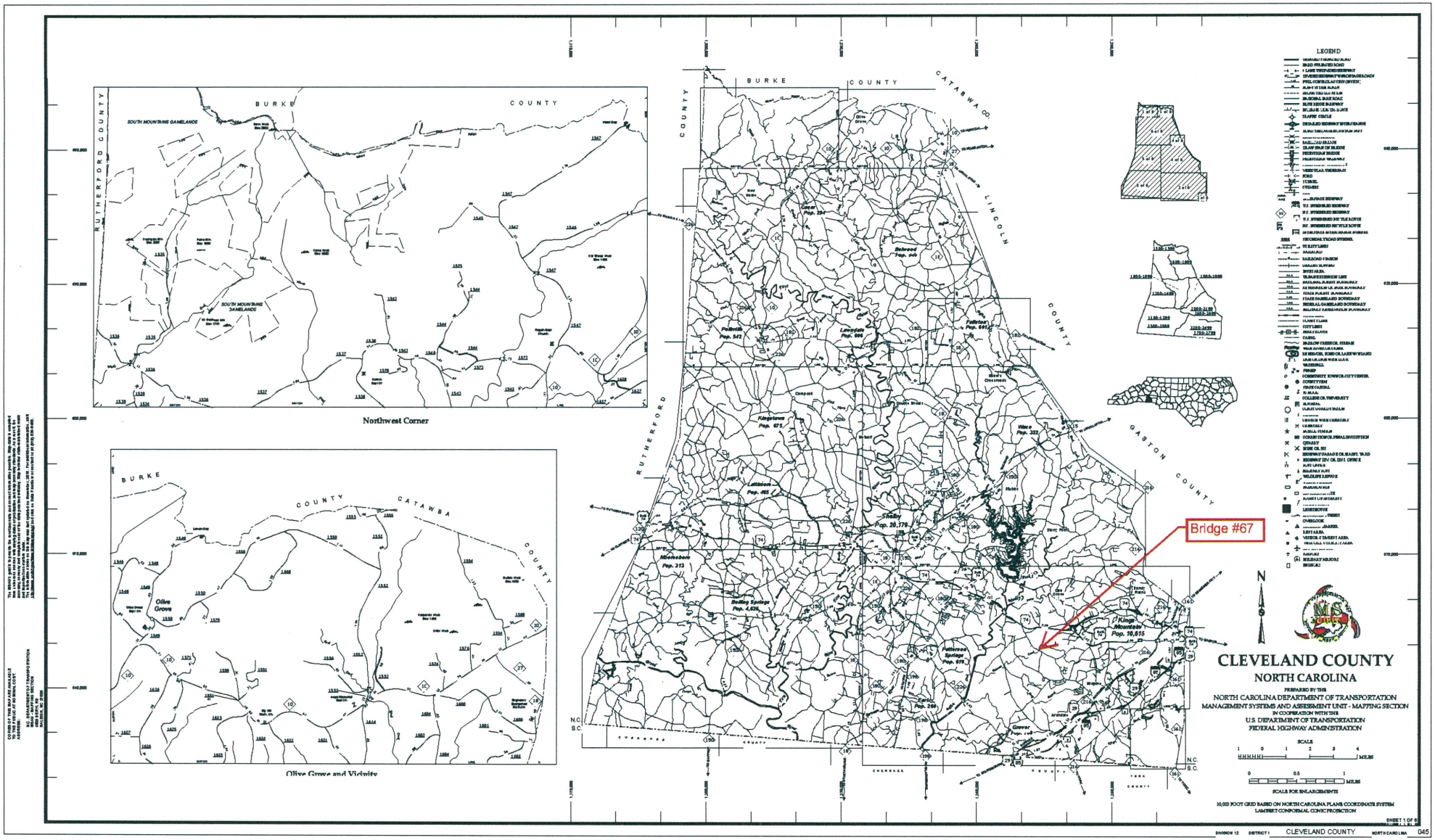
Trout Stream YES ✓ Anadromous Fish NO Primary Nursery Area YES
High Quality Waters NO Nutrient Sensitive Waters NO
Near Water Supply Intake N/A ✓ CAMA County NO
Stream Classification C STREAM # 9-53-8
DENR River Basin Info. BROAD RIVER BASIN

42
43
49
76

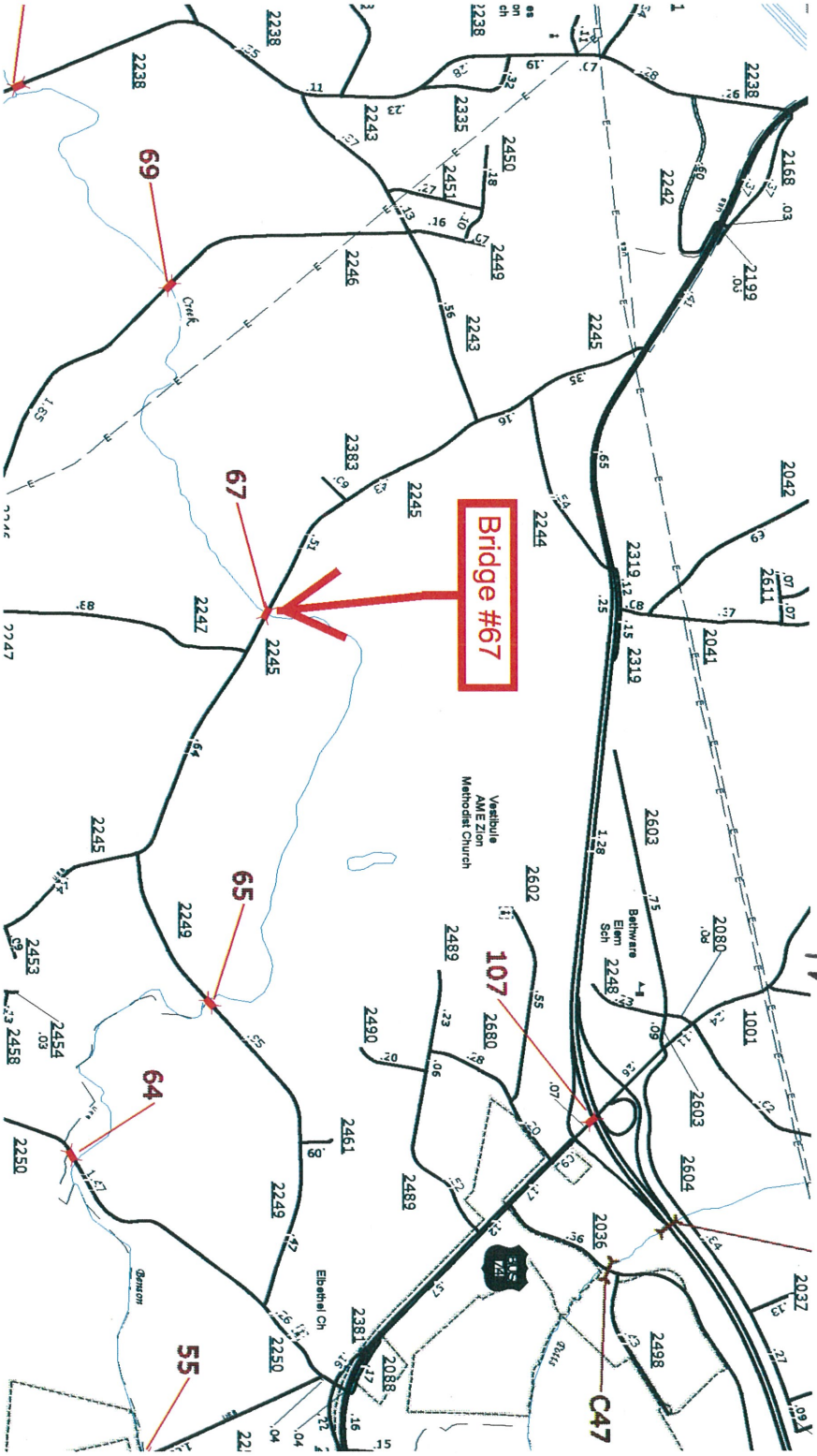
C-16 SHT 2

2-5-16

67

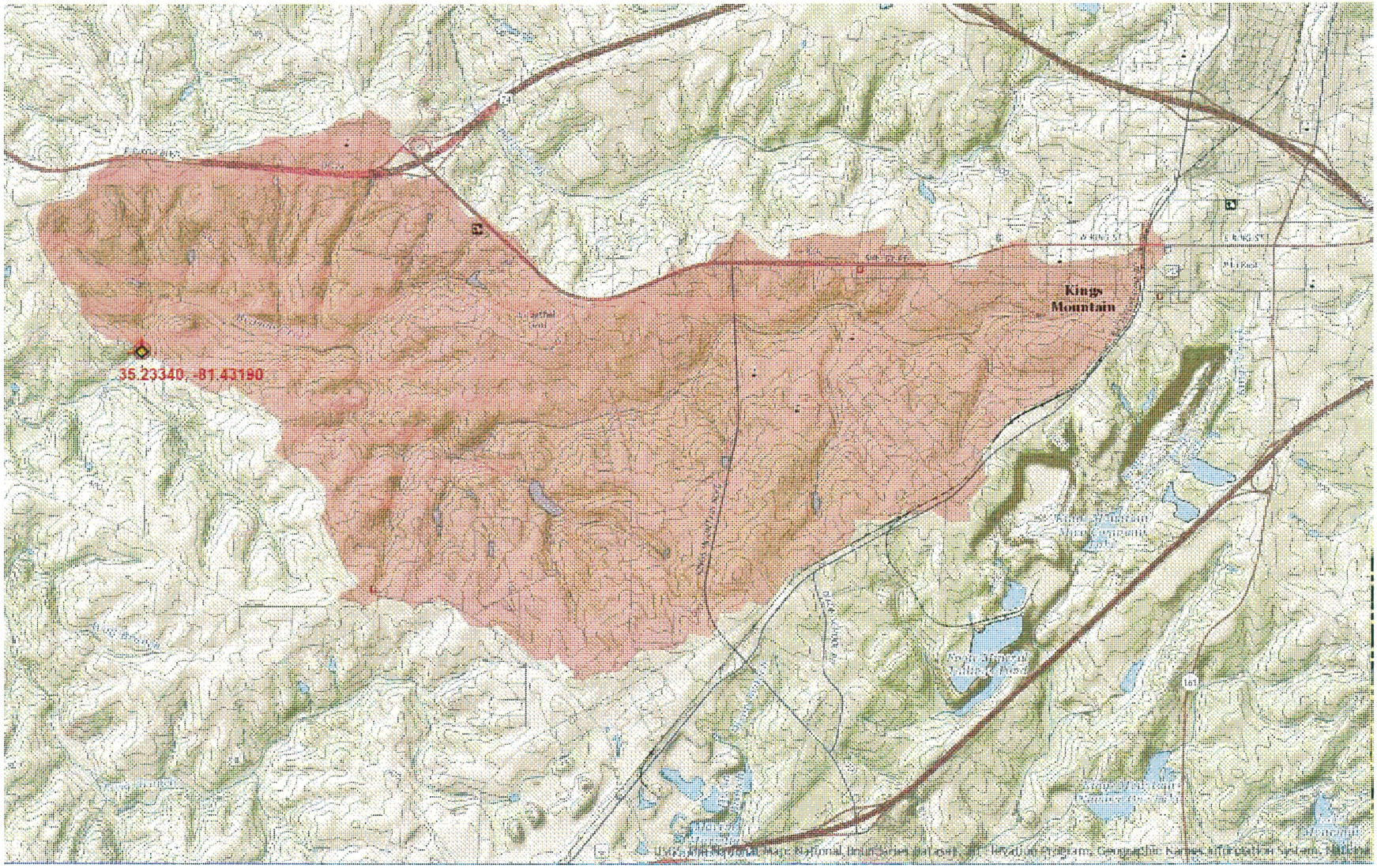

Northwest Corner
Olive Grove and Vicinity
Bridge #67
CLEVELAND COUNTY
NORTH CAROLINA
PREPARED BY THE
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
MANAGEMENT SYSTEMS AND ASSESSMENT UNIT - MAPPING SECTION
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
SCALE FOR ENLARGEMENTS
10,000 FOOT GRID BASED ON NORTH CAROLINA PLANE COORDINATE SYSTEM
LAMBERT CONFORMAL CONIC PROJECTION
DIVISION 12
DISTRICT 1
CLEVELAND COUNTY
NORTH CAROLINA
045

67


Bridge #67
67
69
65
64
55
107
C47
Vestibule AME Zion Methodist Church
Bethware Elem Sch
Elbethel Ch
Creek
Branch
2238
2242
2168
2199
2335
2450
2451
2449
2246
2243
2245
2383
2244
2042
2611
2319
2041
2247
2602
2603
2080
1001
2604
2036
2037
2498
2088
2381
2250
2249
2461
2489
2490
2680
2248
2453
2454
2458

B-5844 Bridge #67
DA. 7.85 SQ Mi

67



67

StreamStats Version 3.0

Flow Statistics Ungaged Site Report

Date: Tues Feb 2, 2016 10:09:26 AM GMT-5
Study Area: North Carolina
NAD 1983 Latitude: 35.2333 (35 14 00)
NAD 1983 Longitude: -81.4319 (-81 25 55)
Drainage Area: 7.85 mi2

Peak Flows Region Grid Basin Characteristics			
100% Peak Southeast US over 1 sqmi 2009 5158 (7.85 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.85	1	9000
Percent Area in Region 1 (percent)	100.000	0	100
Percent Area in Region 2 (percent)	0.000	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=7.85			
Percent imperviousness of basin area 2006 NLCD=8.55			
100% Region 1 Urban over 3 sqmi 2014 5030 (7.85 mi2)			
Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	7.85	3	436
Percent Impervious NLCD2006 (percent)	8.55	0	47.9

Peak Flows Region Grid Statistics						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max
PK2	604	ft3/s	35		348	1050
PK5	1070	ft3/s	34		623	1850
PK10	1420	ft3/s	35		810	2490
PK25	1870	ft3/s	38		1030	3400
PK50	2270	ft3/s	40		1210	4260
PK100	2640	ft3/s	42		1360	5120
PK200	3000	ft3/s	44		1490	6020
PK500	3560	ft3/s	48		1690	7500

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						
Statistic	Value	Unit	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
					Min	Max

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STRUCTURE MANAGEMENT UNIT

ATTENTION: PRIORITY MAINT AND TEMP REPAIRS TO BEAMS/CAPS/PILE IN PAST

Structure Safety Report

Routine Element Inspection

COUNTY: CLEVELAND **STRUCTURE NUMBER:** 220067 **FREQUENCY:** 24 MONTHS

FACILITY CARRIED: SR2245 **MILE POST:**

LOCATION: 0.2 MI. N. JCT. SR2247

FEATURE INTERSECTED: BEASON CREEK

LATITUDE: 35° 14' 0.09" **LONGITUDE:** 81° 25' 54.98"

SUPERSTRUCTURE: TIMBER DECK ON I-BEAMS

SUBSTRUCTURE: END & INTERIOR BENTS:TIMBER CAPS & PILES,TIMBER BULKHEADS

SPANS: 1@25"0", 2@25"4"

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

PRESENT CONDITION: Poor **INSPECTION DATE:** 01/08/2015

POSTED SV: 14 **POSTED TTST:** 20

OTHER SIGNS PRESENT: (4) DELINEATORS



SOUTH APPROACH

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
derek rickus		eric patterson

Structure: 220067 County: CLEVELAND Date: 01/08/2015 Structure Photos



SOUTH APPROACH



POSTING



NORTH APPROACH



UPSTREAM

BRIDGE MANAGEMENT UNIT

DATA ON EXISTING STRUCTURE Run Date: 07/15/2015

COUNTY :	DIVISION :	DISTRICT:	STRUCTURE NUMBER :	LENGTH :
CLEVELAND	12	1	220067	76 FEET

ROUTE CARRIED : SR2245

FEATURE INTERSECTED : BEASON CREEK

LOCATED : 0.2 MI. N. JCT. SR2247

BRIDGE NAME :

CITY :

FUNC. CLASS :	SYST.ON :	SYST.UNDER :	ADT & YR :	RAIL TYPE :
09	NFA	NFA	1800 2012	LT 227 RT 227

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

REHAB :	BY :	PROJ :	ALIGNMENT :	SKEW :	LANES :
	BMU	5.8051	TAN	90	ON 2 UNDER 0

NAVIGATION :					HT. CRN. TO BED :		WATER DEPTH :	
VC	0	FT	HC	0 FT	15	FT	1	FT

SUPERSTRUCTURE : TIMBER DECK ON I-BEAMS

SUBSTRUCTURE : E.BTS & INT.BTS:TIMBER CAPS/TIMBER PILES

SPANS : 1@25', 2@25'-4"

BEAMS OR GIRDERS : 10 LINES 12 I-BEAMS @ 2'-7" CENTERS

FLOOR :	ENCROACHMENT :	DECK (OUT TO OUT) :
4X8"TIM/3" AWS		25.333 FT

CLEAR ROADWAY :	BETWEEN RAILS :	SIDEWALK OR CURB :			
24.333 FT	25 FT	LT	.3335 FT	RT	.3335 FT

VERT.CL.OVER : 999.9 FT

INV.RTG. :	OPE.RTG. :	CONTR.MEMBER :	POSTED :			
HS-3	HS-6	IntBm (SecLoss)	SV 6	TTST 0	DATE	01/20/2015

SYSTEM : Secondary S.R. Route

GREEN LINE ROUTE : N

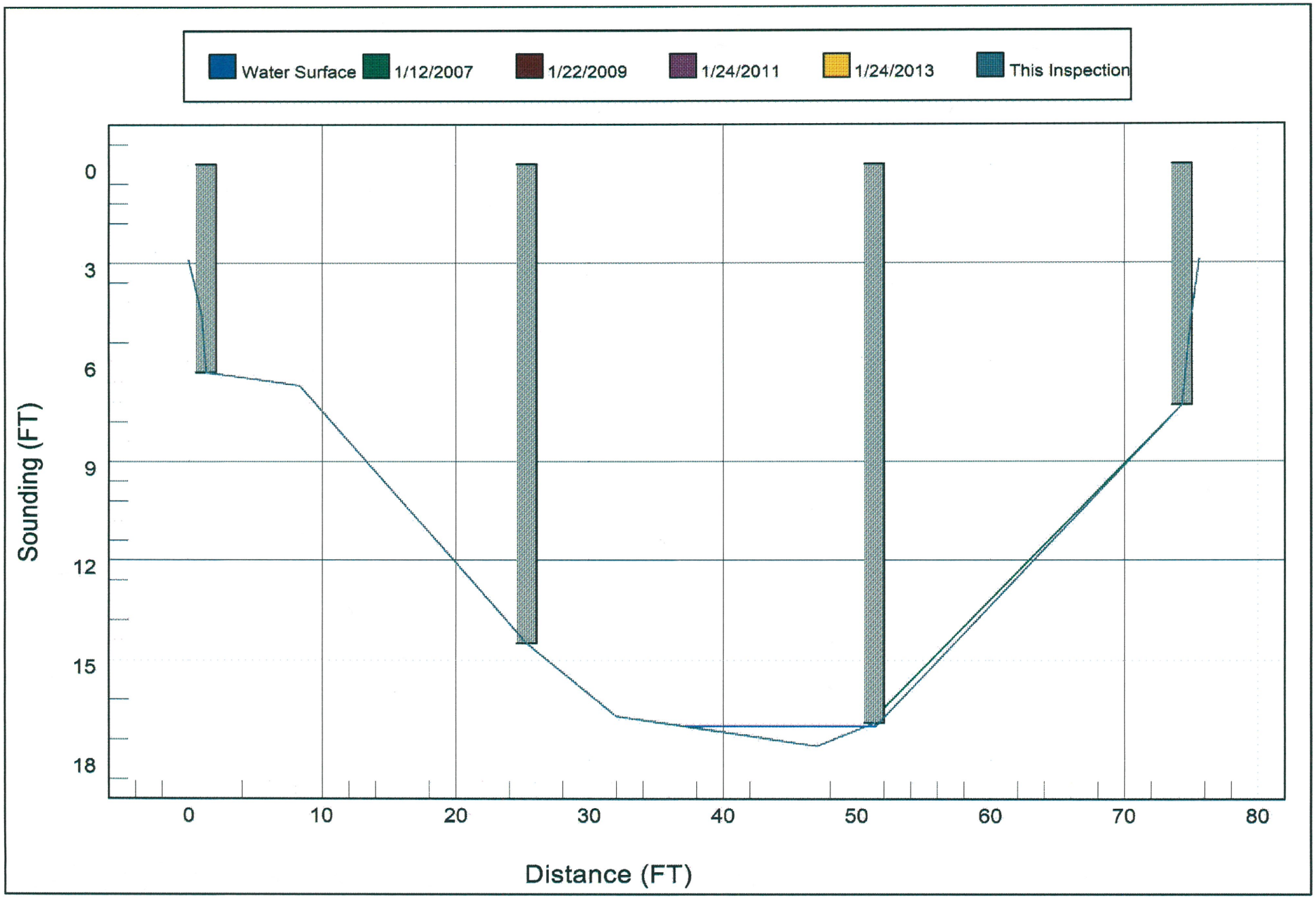
UNDER ROUTES AND CLEARANCES

REMARKS :

Bridge: 220067 County CLEVELAND Date:

STREAMBED PROFILE (Downstream)

Top of Rail = 0 FT (Sounding)



67

rev. 5/2009

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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

BRIDGE SCOUR REPORT

COUNTY: Cleveland BRIDGE: 067 ROUTE: SR 2245 STREAM CROSSED: Beason Creek

ASSESSMENT: Yes EVALUATION: _____ BY: JJB DATE: 06/03/2009

FHWA STRUCTURE INVENTORY & APPRAISAL CODES:

SUBSTRUCTURE CONDITION (ITEM 60)
CHANNEL AND CHANNEL PROTECTION (ITEM 61)
WATERWAY ADEQUACY (ITEM 71)
SCOUR CRITICAL BRIDGE (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 DEPTH (UPSTREAM FACE, FROM TOP OF RAIL):

REQUIRED ACTION:_____

INCREASE UNDERWATER INSPECTION CYCLE? YES_____ NO ✓ FREQUENCY_____

COUNTER MEASURES:

PLAN REQUIRED? YES ✓ NO_____
SUMMARY OF PLAN:
Place class II rip rap @ B1. See attached drawing.

CONSTRUCTION COMPLETE DATE:_____
FINAL CODING AFTER WORK IS COMPLETED (ITEM 113) 5 DATE:_____

BRIDGE MAINTENANCE COMMENTS:
Code 5 after repairs done.

BRIDGE SCOUR EVALUATION ASSESSMENT

AND

DATA SUMMARY REPORT

ASSESSED: 6/3/2009
BY: JJB
CODE: 4
CLASSIFIED: Low Risk

SITE IDENTIFICATION:

COUNTY Cleveland CITY/TOWN _____ BRIDGE NO. 067
ROUTE SR 2245 STREAM Beason Creek ROAD MILE _____
DUAL BRIDGE NO. ___ IS US/DS
ORIGINAL PROJECT NO. _____ YEAR BUILT 1951
REHAB PROJECT NO. _____ YEAR BUILT 1972
CURRENT ADT 3000 YEAR 2003 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/DOWN STREAM): _____
BRIDGE INSPECTION REPORT (DATE): 1/25/2005
UNDERWATER INSPECTION (DATE, CYCLE): _____
STRUCTURE DATA FILE (DATE): _____
OTHER Work order (DATE): 1972

HYDRAULIC DATA:

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

HISTORICAL FLOODS

DATE	ELEV. (FT BELOW TOP OF RAIL)	APPROX. FREQ. (YEARS)	APPROX. DISCH.	ADJUSTED TO SITE

SOURCE _____

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

SOURCE _____

COMMENTS: _____

STRUCTURE DATA:

BRIDGE LENGTH: 76'
SUFFICIENCY RATING 49.3
NO. OF SPANS 3
BED TO CROWN 15'

EST. REMAINING LIFE YRS: _____ **DATE:** 6/3/2009
SPAN LENGTHS 3@~25'
SIMPLE OR CONTINUOUS _____
TOP OF RAIL ELEVATION 0' [measure down from]**T HALWEG ELEVATION** 19.2'

BENT NO. (W-E, N-S)		EB1	B1	B2	EB2			
TYPE		Timber cap/	Timber cap/					
SKEW		timber pile	timber pile					
FTG./FOUNDATION TYPE								
FOOTING THICKNESS								
TOP FTG. ELEV.	LT							
	CTR							
	RT							
BOTTOM FTG. ELEV.	LT							
	CTR							
	RT							
TOP SILL ELEV.	LT							
	CTR							
	RT							
BOTTOM SILL ELEV.	LT							
	CTR							
	RT							
CONC./ RIP RAP PROTECTION								
PILE TYPE								
PILE LENGTH (AVERAGE)								
PILE TIP ELEV. (AVERAGE)		not tested	not tested	26.7'	not tested			
PILE EMBED BELOW THALWEG				7.5'				
FTG. EMBED BELOW THALWEG								

COMMENTS: B1P2 spiced and encased.

69

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_✓_ MILD_____ HIGH_____

(0°-5°) (5°-20°) (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 N/A
2. POTENTIAL FOR SLOW CHANGE OVER TIME. NOT PRONE TO A MAJOR ONE-EVENT CHANGE. N/A
3. UNSTABLE SUBJECT TO RAPID EVOLUTIONARY CHANGE N/A

ASSESSMENT CRITERIA:

1) SPREAD FOOTINGS WITHIN THE POTENTIAL CHANNEL SCOUR AREA ARE INDICATED BY FIELD INVESTIGATION OR BORING LOG ANALYSIS TO BE ON SCOUR RESISTANT MATERIAL.
GEOTECHNICAL CONCURRENCE BY:_____

2) AS-BUILT PLANS INDICATE THE SPREAD FOOTINGS WITHIN THE POTENTIAL CHANNEL SCOUR AREA TO BE KEYED AT LEAST 6" INTO ROCK. _____

3) STEEL PILE BENTS WITHIN THE POTENTIAL CHANNEL SCOUR AREA HAVE a) AVERAGE PILE TIPS THAT PENETRATE A MINIMUM OF 12 FEET BELOW STREAM BED OR b) HAVE LESS THAN 22 +/- FEET (LONGER IF BRACING CONSIDERED)OF TOTAL PILE LENGTH AND INDICATED BY: BORINGS LOGS, PILE DRIVE RECORDS, OR ROD SOUNDINGS TO BE TIPPED INTO POINT BEARING MATERIAL. a)_____ b)_____

4) CONCRETE OR TIMBER BENTS WITHIN THE POTENTIAL CHANNEL SCOUR AREA HAVE a) AVERAGE PILE TIPS THAT PENETRATE A MINIMUM OF 15 FEET BELOW THE STREAM BED OR b) HAVE LESS THAN 18 FEET +/- (LONGER IF BRACING CONSIDERED)OF TOTAL PILE LENGTH AND INDICATED BY BORING LOGS OR ROD SOUNDINGS TO BE TIPPED INTO POINT BEARING MATERIAL. a)_____ b)_____

5) ALL PIERS AND ABUTMENTS ARE OUTSIDE THE NORMAL CHANNEL SECTION. _____

6) THE BRIDGE HAS EXPERIENCED A FLOOD GREATER THAN A 50-YEAR MAGNITUDE WITH NO REPORTED OR APPARENT SCOUR PROBLEM. _____

7) THE BOTTOMS OF THE CHANNEL PIER SPREAD FOOTINGS ARE GREATER THAN 7 FEET BELOW THE STREAM BED. _____

8) THE APPROACH ROADWAY OR BRIDGE IS OVERTOPPED DURING MINOR FLOODS (<10-YEAR EVENT) REQUIRING CLOSURE AND INSPECTION BEFORE REOPENING. _____

THIS STRUCTURE MEETS WHICH OF THE ABOVE LISTED ITEMS FOR CLASSIFICATION AS A LOW RISK STRUCTURE? N/A

BASED ON AN ENGINEERING EVALUATION OF THE AVAILABLE DATA AND REPORTS, THE LOW RISK CLASSIFICATION OF THIS STRUCTURE FOR THE REASON(S) LISTED ABOVE APPEARS REASONABLE. N/A

COMMENTS:

Rods driven to refusal B1:30.2'.

ASSESSMENT DATA:

COUNTY: Cleveland ASSESSMENT DATE: 6/3/2009
BRIDGE NO.: 067

	YES OR NO
INSPECTION REPORTS:	
DATE OF INSPECTION REPORT 1/25/2005	
EXISTING SCOUR HOLES PRESENT	YES
UNDERMINING OF FOOTINGS	N/A
72 FIELD SCOUR EVALUATION- SCOUR HAS OCCURRED	N/A
HYDRAULIC DATA:	
HIGH WATER- OVERTOP OF BRIDGE DECK	N/A
CHANNEL SHIFTING OR DEGRADING	N/A
BAD ANGLE OF ATTACK- STREAM CURVES AT BRIDGE	NO
DEBRIS PROBLEM AT BRIDGE- LEANING TREES ON BANK	NO
GEOTECHNICAL DATA:	
FOUNDATION MATERIAL IS SCOURABLE	N/A
STREAMBED IS SAND W/ NO ARMOR MATERIAL	N/A
STRUCTURAL DATA:	
SMALL ABUTMENTS (NOT MASSIVE)- EASY TO DAMAGE	N/A
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 ERODE	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 RECORDING OF ITEM 113.

DECISION:

CLASSIFIED AS:

SCOUR CRITICAL	
UNKNOWN FOUNDATION	
LOW RISK	✓

RECOMMENDED SCOUR CODE: 4

ASSESSMENT COMMENTS:

B1- Timber pile undetermined length with 166 blow/1' material @ 30.2'

B2- Timber pile 27.6' below Top of Rail.

Scour hole 5'x10'x2' deep @ B1 upstream.

SCHEDULE FOR DETAILED STUDY

SCHEDULE FOR FURTHER IN-HOUSE STUDY

ASSESSED BY: JJB
FIRM: NCDOT
DATE: 6/3/2009
CHECKED BY:
DATE:
FIRM:

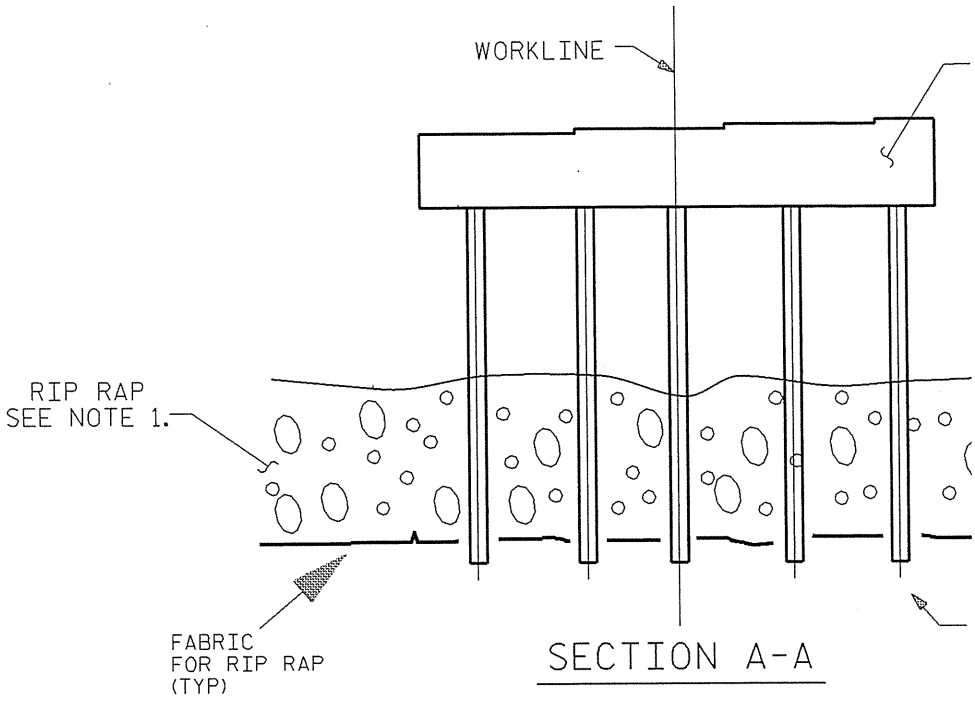
APPROVED BY: JLL
DATE: 6/3/2009

FINAL COMMENTS:

Scour Committee recommends code 4. See report by AFT dated 9/23/2009.

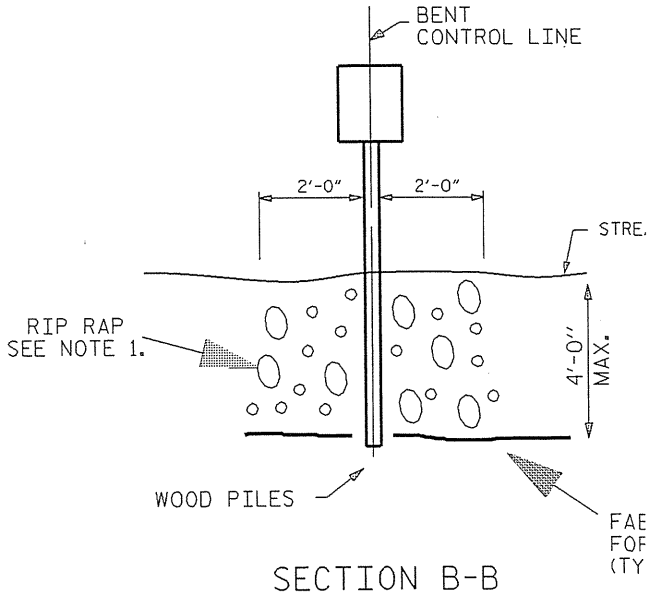
Scour Committee recommends placing class II rip rap @ B1.

After repair, change scour code to 5.



SECTION A-A

INTERIOR BENT 1



SECTION B-B

INTERIOR BENT 1

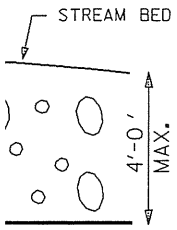
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CHECKED BY :	FA	DATE :	7/08/04

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

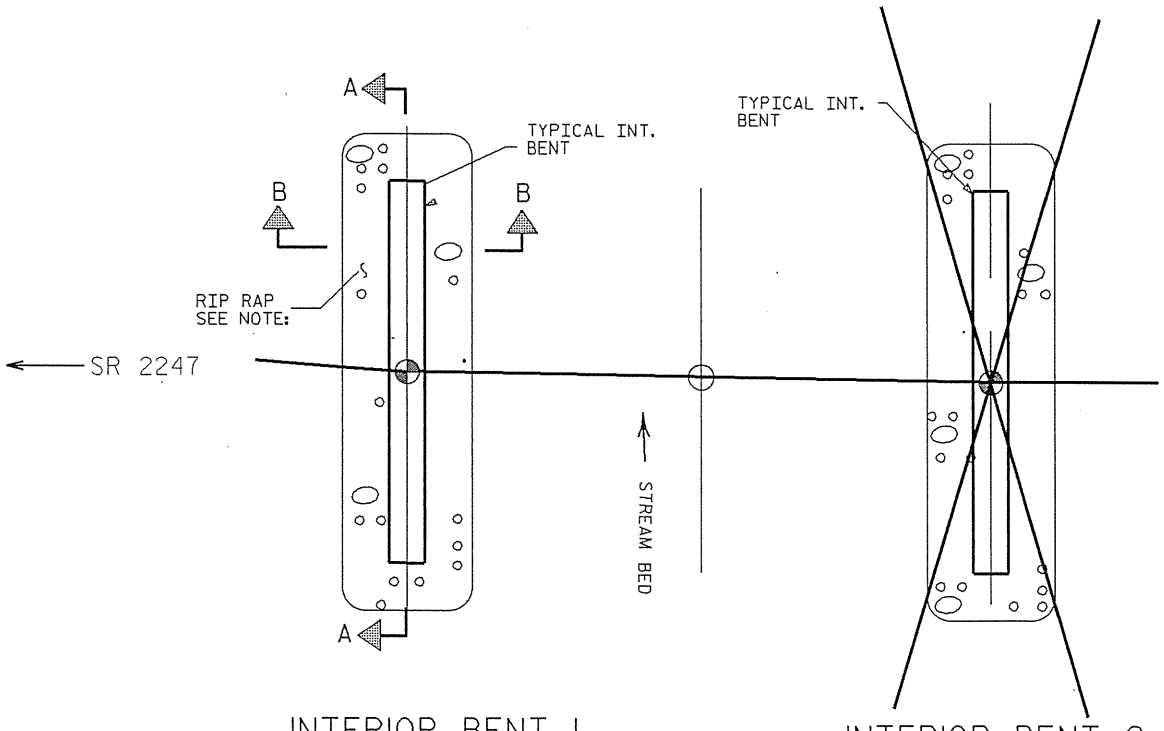
PLAN NOTES:

1. FOR CLASS II RIP RAP TYPE SEE NCDOT STANDARD SPECIFICATIONS
2. OBTAIN PERMITS BEFORE CONSTRUCTION.
3. CONTACT SCOUR ENGINEER IN HYDRAULICS UNIT FOR PRE- CONSTRUCTION MEETING BEFORE CONSTRUCTION BEGIN

ICAL INTERIOR
IT



D PILES



INTERIOR BENT 1 INTERIOR BENT 2

PLAN

)

RAP

BRIDGE NO. CLEVELAND 067
LOCATION: SR 2245
STREAM: BEASON CREEK

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

SCOUR REPAIR @ INTERIOR BENTS RIP RAP

REVISIONS						SHEET NO.
NO.	BY:	DATE:	NO.	BY:	DATE:	
1			3			TOTAL SHEETS
2			4			

Applied Foundation Testing

201 Shannon Oaks Circle, Suite 200, Cary, NC 27511
Phone: (919) 654-7381/Fax: (919) 654-7382
www.testpile.com
North Carolina License No.: P-0294

September 23, 2009

Final Report of
Unknown Bridge
Foundation Investigation
NCDOT Bridge No.: 220067
SR 2245 over Beason Creek
Cleveland County, North Carolina
AFT Project No.: 207004NC



Authored By:

Thomas G. Santee, P.E.
Senior Geotechnical Engineer

Michael J. Simpson, P.E.
Geotechnical Engineer
NC Registration No.: 032060

For: **Mr. Jerry Beard, P.E.**
North Carolina Department of Transportation
Hydraulics Unit
1590 Mail Service Center
Raleigh, NC 27699-1590

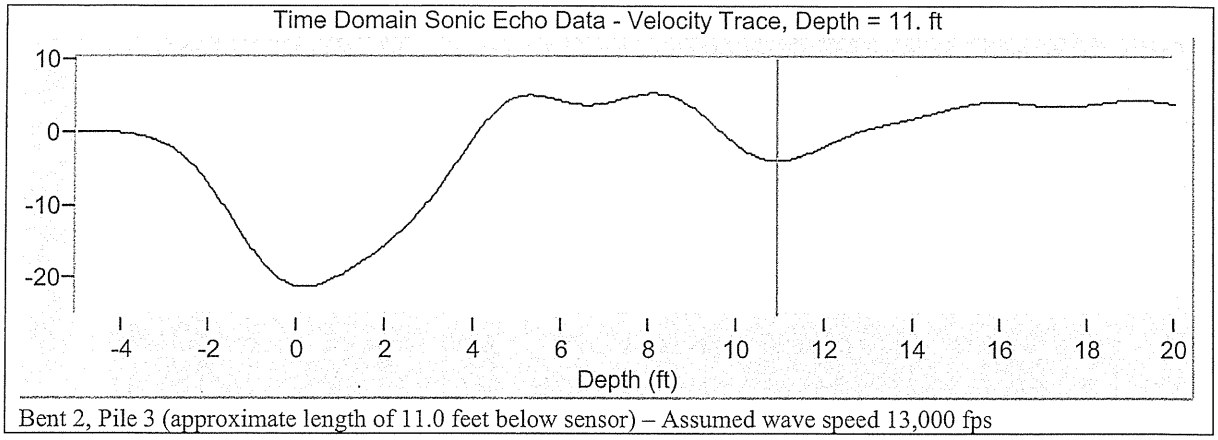
9/23/09

BRIDGE INFORMATION

From Bridge Inspection Report with Inspection Date of: 01/25/2005					
General Information					
Year Built	**Year Rehabilitated**	**Average Daily Traffic (ADT)**	**Year of ADT**	**Steam Sounding History Provided to AFT?**	
1951.	1972	3000	2003	No	
Geometry					
Length (ft)	**No. of Spans**	**Span Lengths (ft)**	**Vertical Clearance Under (ft)**	**Crown to Bed (ft)**	**Thalweg Elevation (ft)**
76	3	~25	12.3	15	19.2 (measured in the field)
Ratings					
Sufficiency Rating	**Substructure Condition (Item 60)**	**Channel & Channel Protection (Item 61)**	**Waterway Adequacy (Item 71)**		
49.3	6	5	6		
Scour Condition (Item 45C)/Problems/Repairs					
6/The stream meanders as it approaches bridge, heavily scouring the upstream south bank. The north bank has been reworked by local resident by filling dirt along scoured north bank. The stream has scoured the upstream end of Bent 1 piles. There is moderate drift lodged up against the south face of Bent 1.					
Foundation Types					
End Bents	Timber cap and timber piles				
Interior Bents	Timber cap and timber piles (Bent 2, Pile 2 encased in concrete at the waterline)				
As-built Information					
As-built Plans Located	No				
Special Substructure Notes	Ordered 25 to 30 foot timber piles to add two piles to each bent in 1972 (work order attached)				
Local High Water Information					
Date of High Water	**High Water Distance below Top of Rail (ft)**	**Does Bridge Overtop during Minor Floods (<10 year event)?**	**Has Bridge Experienced a Flood > 50 year event?**	**Has Bridge Required Closure and Inspection?**	
Unknown	Unknown	No	Likely	No	
Source					
Tim Southard, NCDOT County Bridge Superintendent					
Event Summary					
Events	Unknown				
Field Observations*					
Angle of Stream Attack (Skew Measured from Perpendicular to Bridge)	**Are Large Trees Leaning on Banks?**	**Is Debris on Bents/Abutments/Piers?**	**Has Thalweg Shifted?**		
0	No	Yes, both Bent 1 and Bent 2 piles	Likely		
Noted Scour	Old abutment behind Bent 2 piles.				

*Based on visual inspection on day of site visit. Conditions can differ as time progresses.

SONIC ECHO (LOW STRAIN INTEGRITY TESTING)



Bent 2, Pile 3 (approximate length of 11.0 feet below sensor) – Assumed wave speed 13,000 fps

Estimated Pile Length From Sonic Echo Test					
Pile Location	Estimated Length Below Sensor (ft)	Length Above Sensor (ft)	Estimated Pile Length in Place (ft)	Estimated Top of Pile Elevation (ft)	Estimated Pile Tip Elevation (ft)
Bent 2, Pile 3	11.0	10.0	21.0	5.7	26.7

ROD DRIVES

Rod Drive	1	
Start Elevation	17.2	
Depth (ft)	Estimated Elevation (ft)	Blows/Comments
0-1	18.2	Push
1-2	19.2	10
2-3	20.2	4
3-4	21.2	18
4-5	22.2	10
5-6	23.2	26
6-7	24.2	11
7-8	25.2	24
8-9	26.2	29
9-10	27.2	34
10-11	28.2	52
11-12	29.2	77
12-13	30.2	116

SUMMARY OF EMBEDMENT ESTIMATES

Estimated Pile Embedment					
Bent No.	**Test Method**	**Estimated Pile Tip Elevation (Distance Below Top of Rail)**	**Estimated Groundline Elevation (ft)**	**Estimated Embedment (ft)**	**Estimated Embedment below Thalweg (ft)**
End Bent 1	Not Tested				
Bent 1	Not Tested				
Bent 2	Sonic Echo	26.7	19.2	7.5	7.5
End Bent 2	Not Tested				

LIMITATIONS

The information presented in this report is based on the project information provided to us, limited research of records performed by Applied Foundation Testing, and industry accepted analysis procedures. Applied Foundation Testing has interpreted the archived information to the best of its abilities and has drawn its conclusions based on available information.

All elevations contained within this report are measured in feet, are relative to the Top of Rail, and are based on an elevation of the Top of Rail (top of guardrail on bridge) of 0.0 feet. All pertinent items are located below the Top of Rail and the negative sign has been omitted when calculating the relative elevations to these pertinent items.

The general scope of work for the bridge included the following.

1. Reviewed the bridge file information provided by the North Carolina Department of Transportation (NCDOT).
2. Reviewed available bridge information at the applicable NCDOT Division Office.
3. Performed any agreed upon field testing.
4. Documentation of our findings.

The naming and numbering conventions of the substructure elements are illustrated in the bridge cross-section and plan sketch attached to this report. Please note, the various reports in the bridge files generally contain inconsistent naming and numbering conventions for substructure elements. Therefore we do not try and match these naming and numbering conventions. AFT does review the naming and numbering conventions in an effort to ensure the information in the bridge files is reflected accurately in the bridge cross section and plan sketch and within the text of this report.

Ultra-seismic testing when performed is done using a Freedom Data PC manufactured by Olson Instruments, Inc. For more information on the test method please refer to National Cooperative Highway Research Program Project Number 21-5 (2) Unknown Subsurface Bridge Foundation Testing Final Report. The ultra-seismic test method is a sonic reflection technique using geophysical data processing techniques to analyze the propagation of induced compression and flexural waves as they reflect from foundation substructure boundaries. When performing this method the foundation element is impacted (with a hand held instrumented hammer) at or near the top (horizontally or vertically) and the resulting wave motion is recorded by a multi-channel (vertical, transverse, and radial) accelerometer. The accelerometer is located on the foundation generally near the ground surface for the first data set and then incremented up the foundation (at a selected fixed distance) for each successive data set until reaching the point of hammer impact. Post processing consists of filtering and stacking all the recorded wave forms. Each data set from every foundation element is unique and there is not a standard method for interpretation. Therefore, foundation boundary depth estimates are based on our experience and engineering judgment.

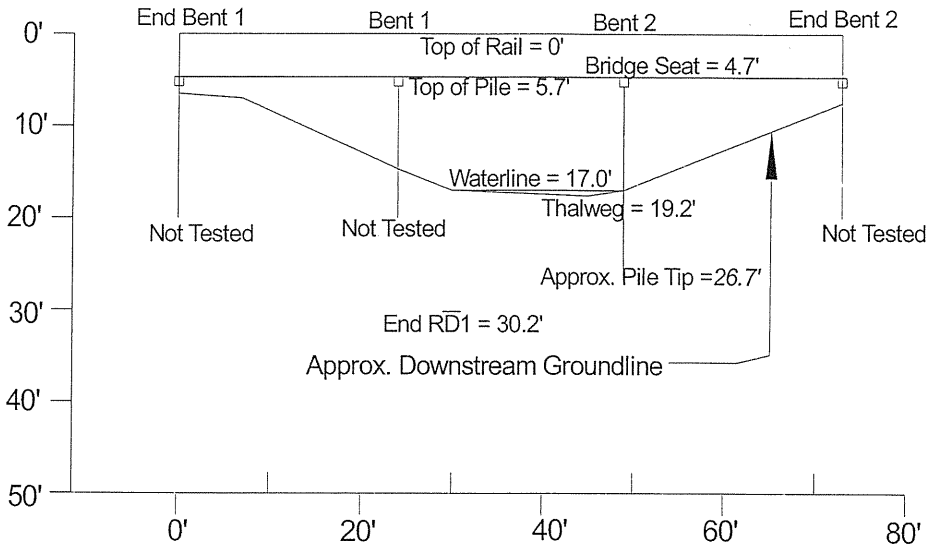
Low strain integrity testing when performed is done in general accordance with ASTM D5882. Testing is generally accomplished using a Freedom Data PC manufactured by Olson Instruments, Inc. or Profound hardware and software manufactured by The Netherlands Organization (TNO). This test method imparts a small strain stress wave into the pile via a hand held hammer and measures the impact event with a sensitive accelerometer mounted to the pile. Reflections are generated from either the pile toe, irregularities in the pile shaft, and/or changes in soil stiffness. Based on the time period between the impact and reflection from the pile toe and the material wave speed, its length can be estimated. The test method does have limitations and may sometimes provide inconclusive results if the piles are embedded in high friction soils or if the piles have discontinuities. Moreover, piles connected to a cap or beam may be troublesome to analyze due to resonant waves from the cap. In general a number of locations on a pile for both accelerometer placement and hammer impact are tried. Impacts are generated with small and large hammers. Many impact signals are generally obtained. The best signals are then stored on the field computer for later post processing. Post processing consists of exponentially amplifying the signals to overcome damping from shaft friction and emphasize the pile toe reflection. Smoothing is also performed on some of the signals to eliminate high frequencies or noise. The pile material compression wave speed (16,808 feet per second {ft/s} for steel piles, 11,500 to 14,500 ft/s for concrete piles, and 9,000 to 18,000 ft/s for timber piles) is estimated based on pile material type and can have a significant effect on estimated pile length. Each data set from every pile is unique and there is not a standard method for interpretation. Therefore, pile length estimates are based on our experience and engineering judgment.

Rod drives are performed with half inch diameter solid steel rods and a 16 pound hammer using a two foot drop. Blows to drive the rod are generally recorded in one foot increments unless refusal occurs. Refer to the bridge sketch for approximate locations of rod drives.

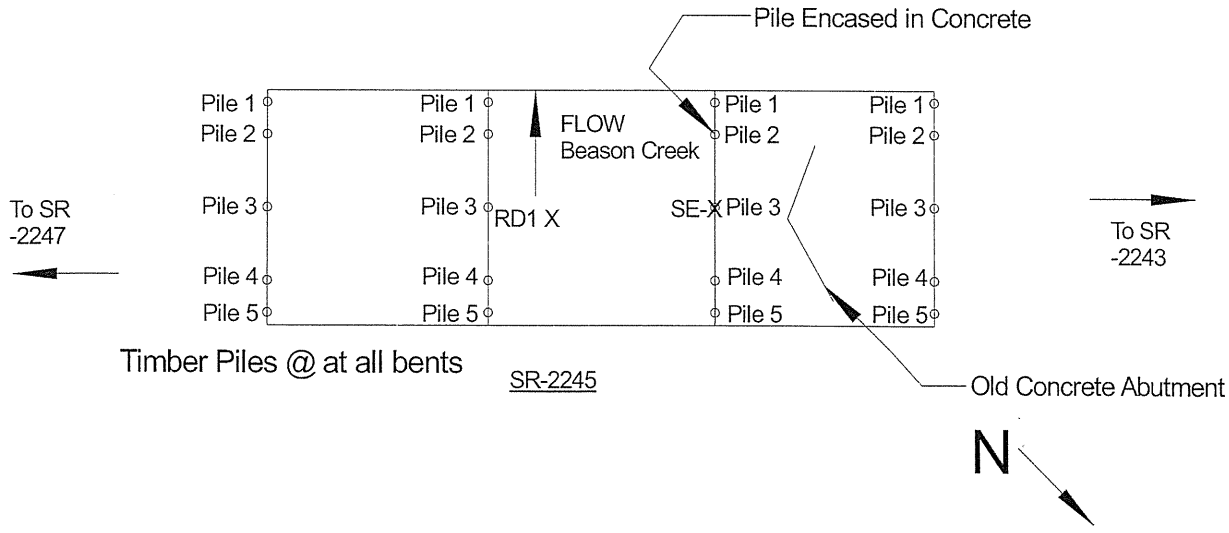
When historical downstream and upstream streambed soundings are provided to AFT, we develop plots using the provided information to compare channel migration and/or scour along the bridge length. These plots are based on actual information gathered by others and are representative of the depth to the ground measured from the top of rail.

Embedment depths are estimated based on available information provided to AFT and field testing (when conducted). The top of footing elevation is generally based on measurements taken in the field. Rod probes are performed when tops of footings are not exposed. Thalweg elevation is based on the deepest streambed sounding from the noted Bridge Inspection Report. Negative embedment indicates the foundation bottom is above the Thalweg elevation. Ground line elevations are based on deepest stream bed sounding for each bent in most recent bridge inspection report.

CROSS SECTION



PLAN VIEW



Timber Piles @ at all bents

SR-2245

1. RD = Rod Drive ; SE = Sonic Echo Testing

Sketch of Cleveland Co. Bridge 220067

Route: SR 2245 over Beason Creek

Project: Unknown Bridge Foundation Investigation

Client: North Carolina Department of Transportation

By: Applied Foundation Testing

AFT Project No.: 207004NC

Applied Foundation Testing
201 Shannon Oaks Circle, Suite 200
Cary, NC 27511
Office: (919) 654-7381 Fax: (919) 654-7382

Cost Sheet. May 12,1972

Itemized List Of Material. Labor,& Rental
Bridge #67 S.R.2245 Cleveland Co.
Work Order #5.805 File # 10009
All Material From Stock

Material.

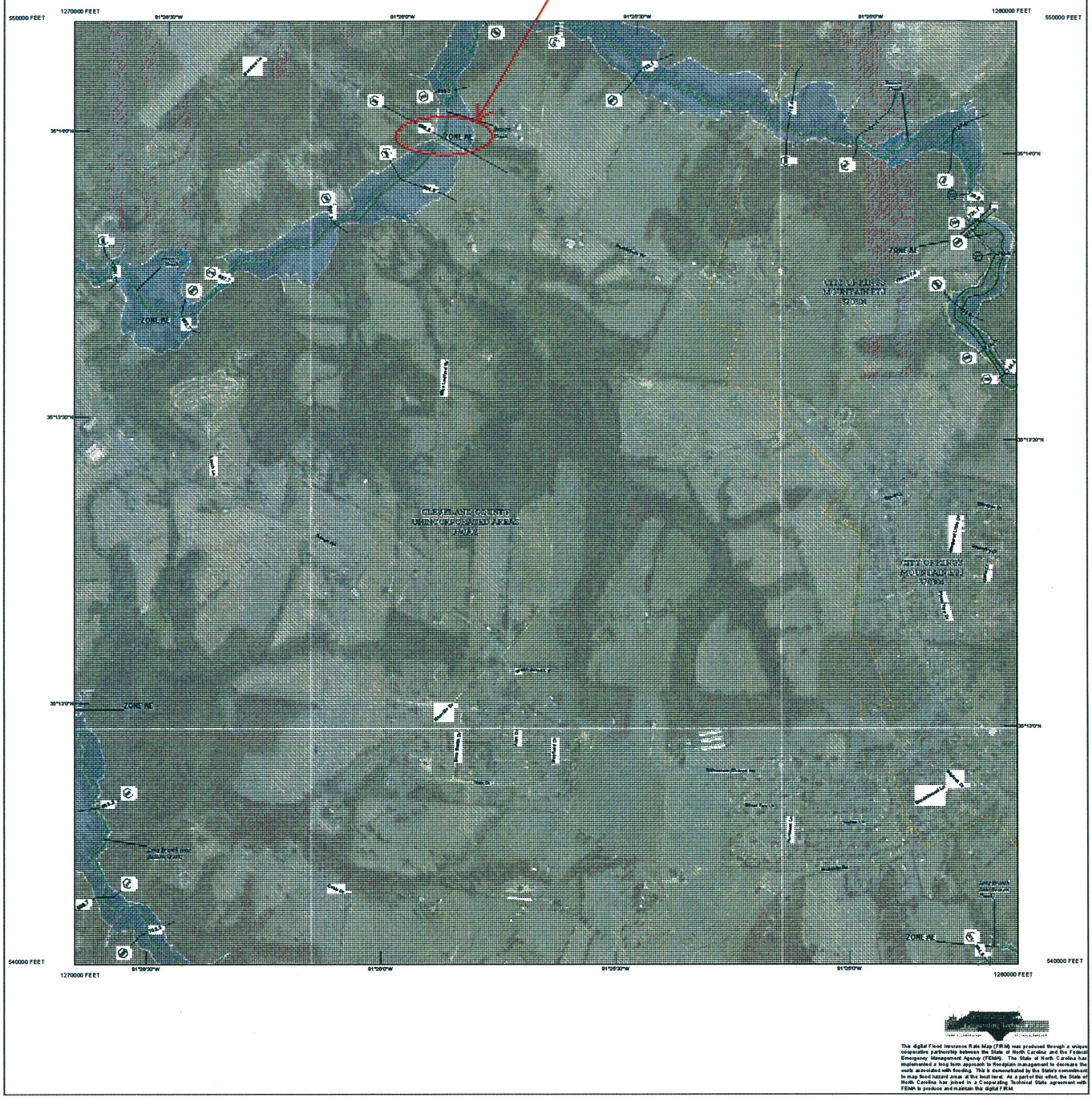
4 - Creo. Piles @ 25 Ft.		100 Lin. FT.	@ 1.20 Per.Ft.		120.00
8 - " " @ 30 Ft.		240 " "	@ 1.20 " "		288.00
4 - Pcs. 12" x 12" x 26'	Creo.Timber	1,248 Bd.Ft.	@ 22½¢ Per.Ft.		280.80
45 - " 4" x 8" x 18'	" "	2,160 " "	@ .22½¢ " "		486.00
430 - " 3" x 4" x 20'	" "	8,600 " "	@ .22½¢ " "		1,935.00
8 - " 3" x 10" x 18'	" "	360 " "	@ .22½¢ " "		81.00
36 - " 3" x 8" x 18'	" "	1,296 " "	@ .22½¢ " "		291.60
12 - " 1½" x 8" x 16'	" "	192 " "	@ .22½¢ " "		43.20
14 - " 6" x 6" x 16'	" "	672 " "	@ .22½¢ " "		151.20
12 - " 4" x 6" x 16'	Treated Timber	384 " "	@ .15½¢ " "		59.52
8 - " 2" x 6" x 16'	" "	128 " "	@ .15½¢ " "		19.84
22 - " 2" x 6" x 18'	" "	396 " "	@ .15½¢ " "		61.36
300 - 5/8" x 4½"	Bolts	1,350 Inchs	@ .05¢ Per.inch		67.50
36 - 5/8" x 10"	"	360 "	@ .04¢ " "		14.40
42 - 5/8" x 16"	"	672 "	@ .04¢ " "		26.88
14 - 5/8" x 17"	"	238 "	@ .04¢ " "		9.52
40 - 5/8" x 18"	"	720 "	@ .04¢ " "		28.80
4 - 5/8" x 20"	"	80 "	@ .04¢ " "		3.20
60 - 3/4" x 8"	Lag Screws	480 Inchs.	@ .04¢ Per.inch		19.20
20 - 3/4" x 24"	Drift Pins		@ .60¢ Each		12.00
900 Lbs.	Plain Nails		@ .14¢ Per Lb.		126.00
10 - Gal. Paint			@ 5.00 Per.gal.		50.00
2 - Pcs. 36" x 96" Metal Sheets Galvanized			@ 3.00 Each		6.00
				Total.	4,181.02

Material	4,181.02
Labor	4,774.88
Rental	1,265.25
Total Cost.	10,221.15

Don Henderson

67

Bridge #67



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, 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
- 513 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

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 web site 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 maintain accreditation, the levee owner or community is required to submit the data and documentation necessary by 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 indicate 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.

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 by 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 indicate 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

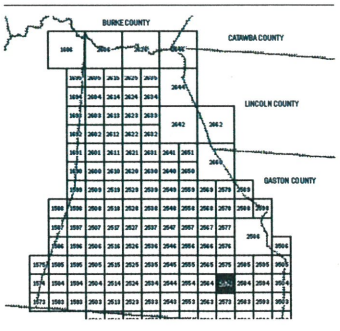
SCALE

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

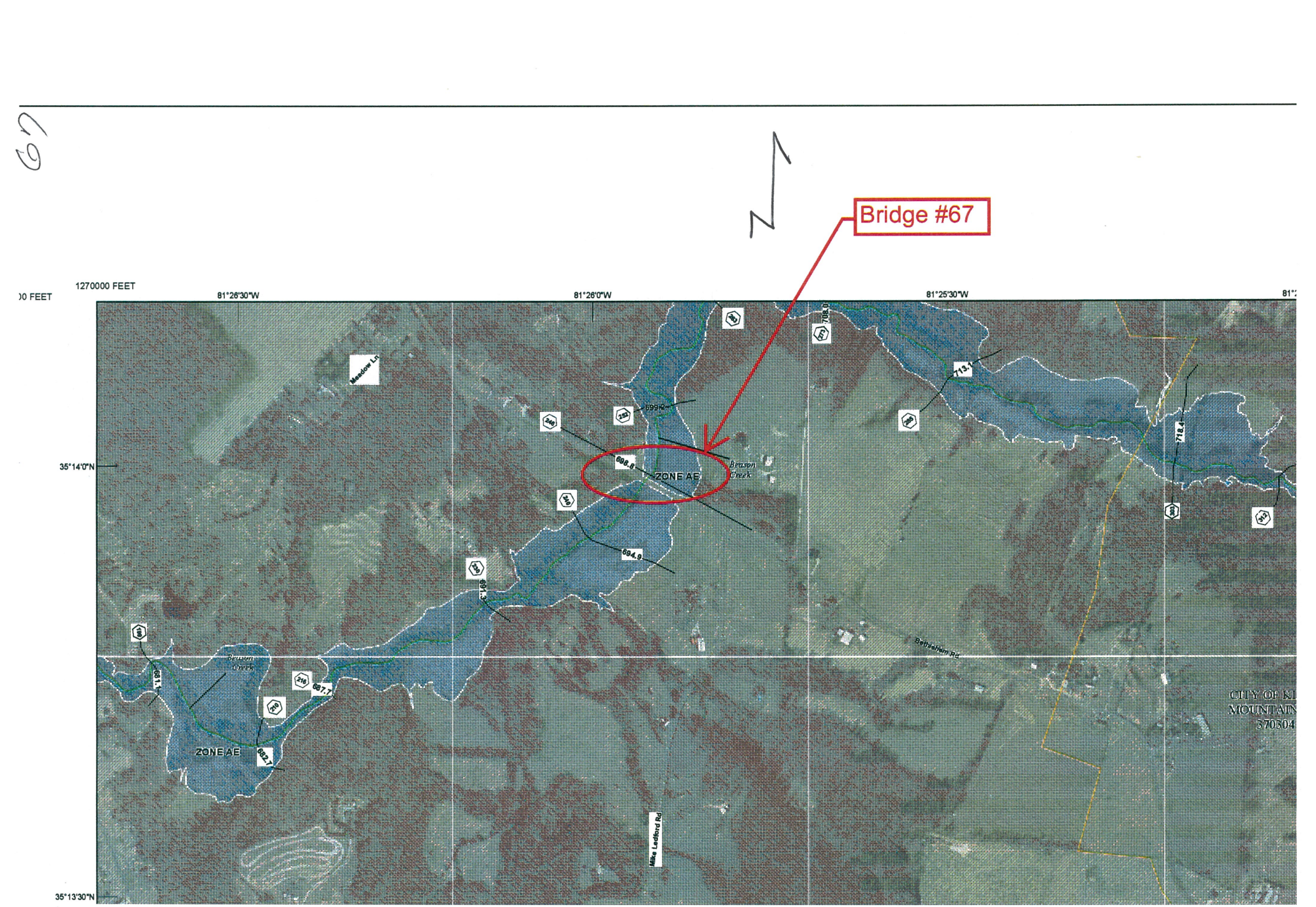
NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

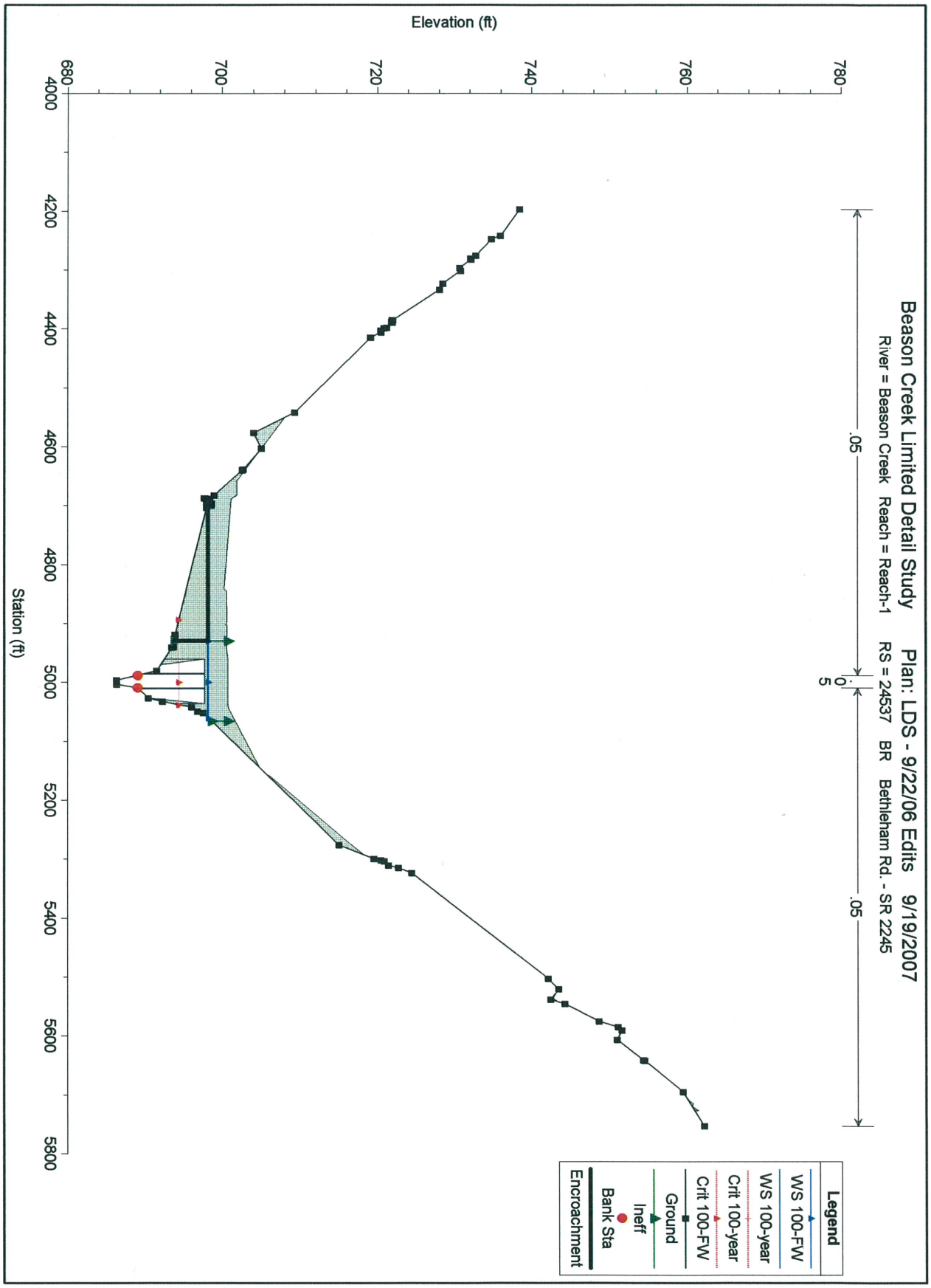
NORTH CAROLINA

PANEL 2574

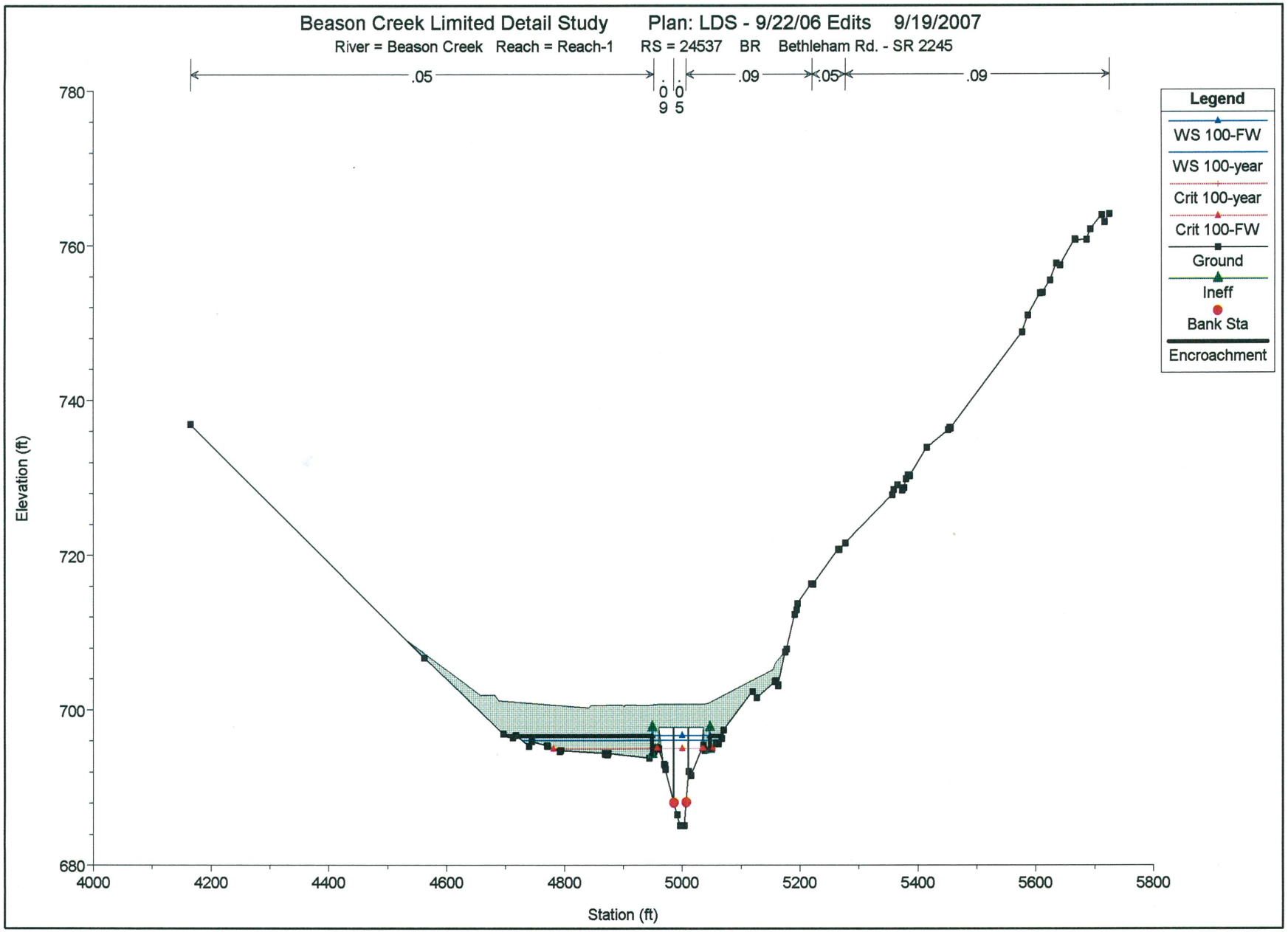
COMMUNITY	CID	PANEL	SUFFIX
CLEVELAND COUNTY	370302	2574	J
KINGS MOUNTAIN, CITY OF	370304	2574	J

MAP NUMBER


Bridge #67
1270000 FEET
81°26'30"W
81°26'0"W
81°25'30"W
35°14'0"N
35°13'30"N
ZONE AE
ZONE AE
Meadow Ln
Bethlehem Rd
Mike Ledford Rd
Brushy Creek
Brushy Creek
699.8
694.9
691.3
691.1
697.7
692.7
708.0
713.1
718.4


Beason Creek Limited Detail Study Plan: LDS - 9/22/06 Edits 9/19/2007
River = Beason Creek Reach = Reach-1 RS = 24537 BR Bethleham Rd. - SR 2245
.05
0.5
.05
Elevation (ft)
780
760
740
720
700
680
4000
4200
4400
4600
4800
5000
5200
5400
5600
5800
Station (ft)
Legend
WS 100-FW
WS 100-year
Crit 100-year
Crit 100-FW
Ground
Ineff
Bank Sta
Encroachment

67


Beason Creek Limited Detail Study
Plan: LDS - 9/22/06 Edits 9/19/2007
River = Beason Creek Reach = Reach-1 RS = 24537 BR Bethleham Rd. - SR 2245
.05
.09
.05
.09
0 0
9 5
Legend
WS 100-FW
WS 100-year
Crit 100-year
Crit 100-FW
Ground
Ineff
Bank Sta
Encroachment
Elevation (ft)
780
760
740
720
700
680
4000
4200
4400
4600
4800
5000
5200
5400
5600
5800
Station (ft)