

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: BUNCOMBE BRIDGE: 078 ROUTE: NC 197 STREAM CROSSED: N FORK IVY CK
ASSESSMENT YES EVALUATION BY: JJB DATE 3/26/09

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 [checked]

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 [checked] FREQUENCY

COUNTERMEASURES:

PLAN REQUIRED? YES [] NO [checked]

SUMMARY OF PLAN:

[Blank lines for summary of plan]

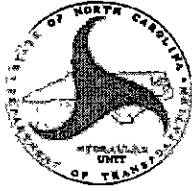
CONSTRUCTION COMPLETED DATE

FINAL CODING AFTER WORK IS COMPLETED (ITEM 113) DATE

BRIDGE MAINTENANCE COMMENTS:

[Blank lines for bridge maintenance comments]

BRIDGE SCOUR EVALUATION ASSESSMENT



AND DATA SUMMARY REPORT

ASSESSED	3/26/09
BY:	JJE
CODE	5
CLASSIFIED	LOW RISK

SITE IDENTIFICATION

COUNTY BUNCOMBE CITY/ TOWN _____ BRIDGE NO. 078
 ROUTE NC 197 STREAM N. FORK IVY CK ROAD MILE _____
 DUAL BRIDGE NO. _____ IS US/ DS _____
 ORIG. PROJECT NO. _____ YEAR BUILT 1950
 REHAB. PROJECT NO. _____ YEAR REHAB. _____
 CURRENT ADT 4100 YEAR 2001 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) 1/2005
- UNDERWATER INSPECTION (DATE, CYCLE)
- STRUCTURE DATA FILE (DATE) 1/2005 1/2003

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
1977	8 0' BELOW TOR			
2004	8 0' BELOW TOR			

SOURCE TERRY DAVIS-NCDOT

FLOOD FREQUENCY (YRS.) _____
 ELEVATION (FT.) _____
 DISCHARGE (CFS) _____
 AVG. VELOCITY (Q/A) _____
 SOURCE: _____

Q _____	Q _____	Q _____	Q _____

COMMENTS: _____

STRUCTURE DATA

BRIDGE LENGTH 64.0
 SUFFICIENCY RATING 74.9
 NO. OF SPANS 2
 BED TO CROWN 3.0

EST. REMAINING LIFE YRS _____ DATE 2/26/2009
 SPAN LENGTHS 1 @ 31'-8, 1 @ 32'-0

SIMPLE OR CONTINUOUS _____

TOP OF RAIL ELEV 0 [DISTANCES ARE MEASURED DOWN] THALWEG ELEVATION 17.0

BENT NO [W-E], [S-N]	EB1	B1	EB2		
TYPE	CONC. ABUT.	CONCRETE	CONC. ABUT		
SKEW		PIER			
FTG./FOUNDATIN TYPE	CONCRETE	CONCRETE	CONCRETE		
FOOTING THICKNESS					
TOP FTG ELEV					
BOT FTG ELEV	15.3	14.9	14.8		
TOP SILL ELEV					
BOT SILL ELEV					
CONC / RIP RAP PROTECTION					
PILE TYPE					
PILE LENGTH [AVERAGE]					
PILE TIP ELEV [AVERAGE]					
PILE EMBED BELOW THALWEG					
FTG EMBED BELOW THALWEG	1.7 BELOW	1.3 BELOW	1.2 BELOW		

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 _____ 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 _____ FT. NARROWED _____ FT.
 AGGRADATED _____ FT. SAME _____ FT. DEGRADATED _____ FT.
 SHIFTED LT. _____ FT. SAME _____ FT. 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		<input checked="" type="checkbox"/>		
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. YES
- 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

rev. 3/97

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.
GEOTECHNICAL CONCURRENCE BY: _____
- 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 OF TOTAL PILE LENGTH AND INDICATED BY: BORING LOGS, PILE DRIVE RECORDS, OR ROD SOUNDINGS TO BE TIPPED INTO POINT BEARING MATERIAL. a) _____
b) _____
- 4) CONCRETE OR TIMBER PILE 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 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. N/A
- 6) THE BRIDGE HAS EXPERIENCED A FLOOD OF GREATER THAN A 50-YEAR MAGNITUDE WITH NO REPORTED OR APPARENT SCOUR PROBLEM N/A
- 7) THE BOTTOMS OF THE CHANNEL PIER SPREAD FOOTINGS ARE GREATER THAN 7 FEET BELOW THE STREAM BED. N/A
- 8) THE APPROACH ROADWAY OR BRIDGE IS OVERTOPPED DURING MINOR FLOODS (< 10-YEAR EVENT) REQUIRING CLOSURE AND INSPECTION BEFORE REOPENING. N/A

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

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 EB`1: 15.0', B1: 15 3', EB2:15.0

ASSESSMENT DATA

County: BUNCOMBE
 Bridge No. 078

Assessment Date. 3/26/09

YES or No

INSPECTION REPORTS:

DATE OF INSPECTION REPORT	1/2005	
EXISTING SCOUR HOLES PRESENT		N
UNDERMINING OF FOOTINGS		N
72 FIELD SCOUR EVALUATION-SCOUR HAS OCCURRED		N/A

HYDRAULIC DATA:

HIGH WATER-OVERTOP BRIDGE DECK	N
CHANNEL SHIFTING OR DEGRADING	N/A
STREAM CONTRACTED AT BRIDGE-NO RELIEF	N/A
BAD ANGLE OF ATTACK-STREAM CURVES AT BRIDGE	Y
DEBRIS PROBLEM @ BRIDGE-LEANING TREES ON BANK	Y

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 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.



NC DOT - HYDRAULICS DEPT
1590 MAIL SERVICE CENTER
RALEIGH, NC 27635-1590

Unknown Foundation Determination

Substructure Report

**Buncombe 100078
NC 197 over North Fork Ivy 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

April 2, 2009

Buncombe 100078

2
4/2/2009

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

Facility Carried: NC-197

Feature: Over North Fork Ivy Creek

Substructure Type: Reinforced Concrete Abutments and Pier

No. of Interior Bents: One (1)

Piles per Bent: NA

Reference Document(s): Bridge Inspection Report from January 2005 found. Structure Data File January 2005 and January 2003 found.

Comments: No noticeable scour at time of testing

Field Work Performed:

- Sounding rods were driven next to EB1, B1 and EB2 to determine the depth to high blow count material
- Dispersive wave propagation testing was conducted on footers of EB1 and EB2.

Bridge Information From January 2005 Inspection Report:

Substructure Condition: 7
Channel and Channel Protection 8
Waterway Adequacy. 8
Bridge Length. 64.0'
Sufficiency Rating: 74.9
Number of Spans: 2 Span Lengths: 31'-8 and 32'-0
Underclearance 5'-9
List of Scour Problems and Repairs: NA
Original Construction: 1950 Year Reconstructed: 0000
Current ADT: 004100 Year 2001
Crown to Bed. 3'-0

Summary of Findings:**Hydraulic Data:****Maintenance Personal : From Terry Davis NCDOT bridge management unit**

Reference to top rail: 8.0'

Date of high water: November 1977 and September 2004

Does bridge overtop during minor floods (<10 year event): No

Requiring closure and inspection before reopening? No**Reported of apparent scour problem?** No scouring, has two tunnel like structures to stop debris from entering creek or getting stuck under bridge (See picture page 4)

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: Mild Curve

Debris: Large Trees Leaning on Bank? Yes

Debris Piled up on Bents? Yes

Has Thalweg Shifted? No

Field Testing Results:

TABLE ½" ROD DRIVES					
BC1		BC2		BC3	
DEPTH FROM TOP OF RAIL	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT	DEPTH (TOR)	BLOWS/ FT
11.9'-12.9'	14	13.2'-14.2'	24	13.0'-14.0'	73
12.9'-13.9'	10	*14.2'-15.2'	136	*14.0'-15.0'	150
13.9'-14.9'	17	15.2'-15.3'	100/2"	-	-
14.9'-15.0'	50/2"	-	-	-	-

* indicates bottom of footer at location of blow count

Sounding Rods

Sounding rods of diameter ½" were driven at EB1 and EB2.

Dispersive Wave Testing

Dispersive wave propagation testing was conducted on the footers of EB1 and EB2 that had been installed during the 1950 construction. The results indicated EB1 is 15.3 ft and EB2 is 14.8 ft from the top of rail to bottom of footer.

Conclusions

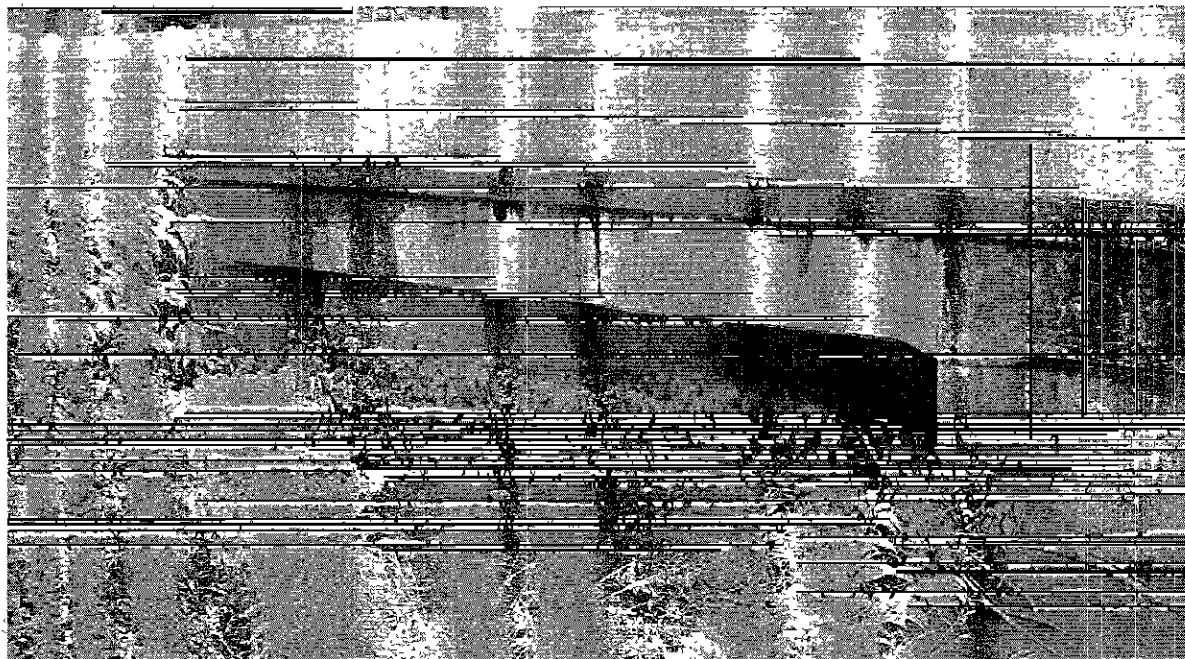
Foundation consists of concrete abutments and concrete footers. EB1 is 15.3 ft, B1 is 14.9 ft and EB2 is 14.8 ft from top of rail to bottom of abutment. Has four boxed concrete barrels (See picture page 4) Sounding data indicates EB1 is sitting on material too hard to penetrate with sounding rods. B1 is sitting on material of 136 BPF and EB2 is sitting on material of 150 BPF.

BOTTOM OF FOOTING			
Pile and Footing Location	Test Method	Top of Rail to Bottom of Footing (FT)	Embedment Below Thalweg (FT)
EB1	DW/ROD	15.3	1.7
B1	ROD	14.9	1.3
EB2	DW/ROD	14.8	1.2

Sounding Rods

Sounding rods driven at a site are 1/2" 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.



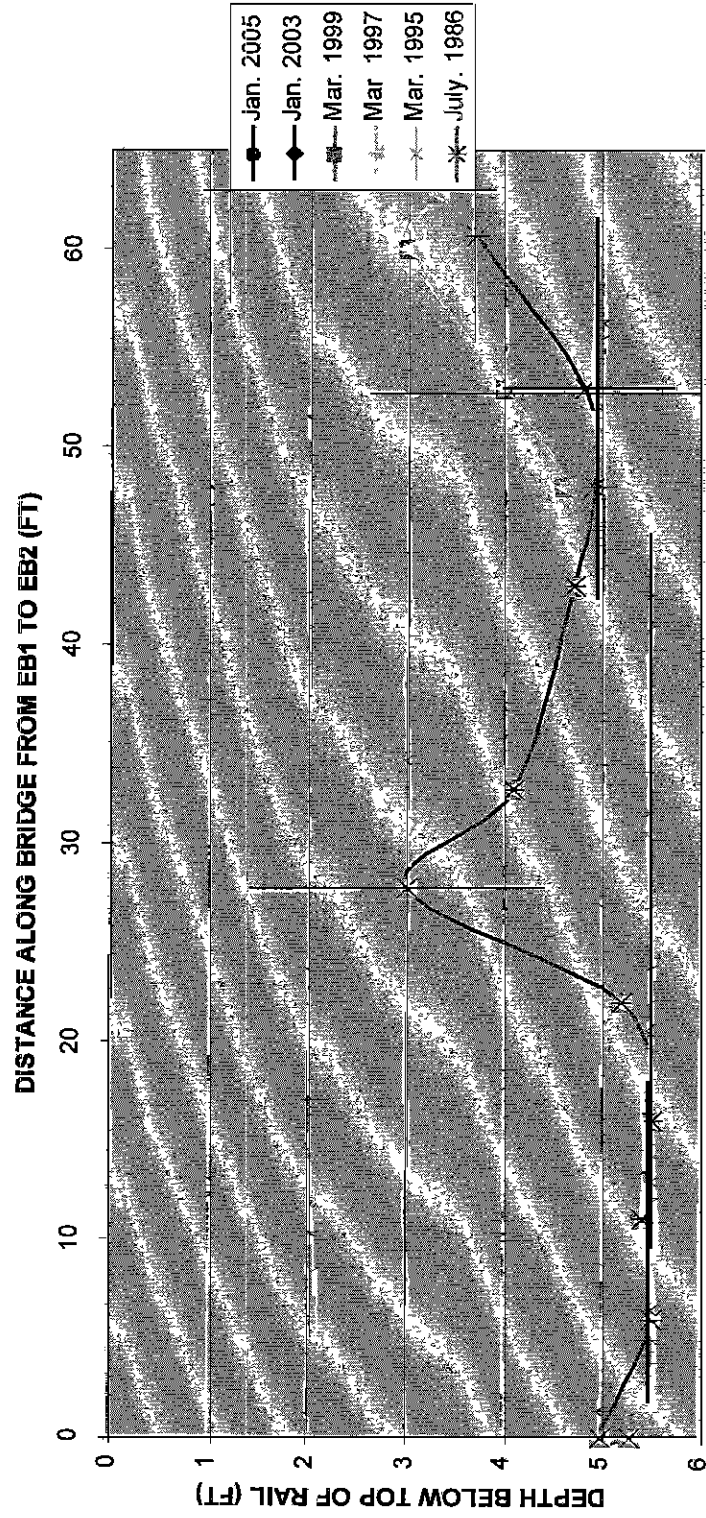
First of four boxed concrete barrels under bridge.

Buncombe 100078

5

10/27/2008

DOWN STREAM BED SOUNDINGS

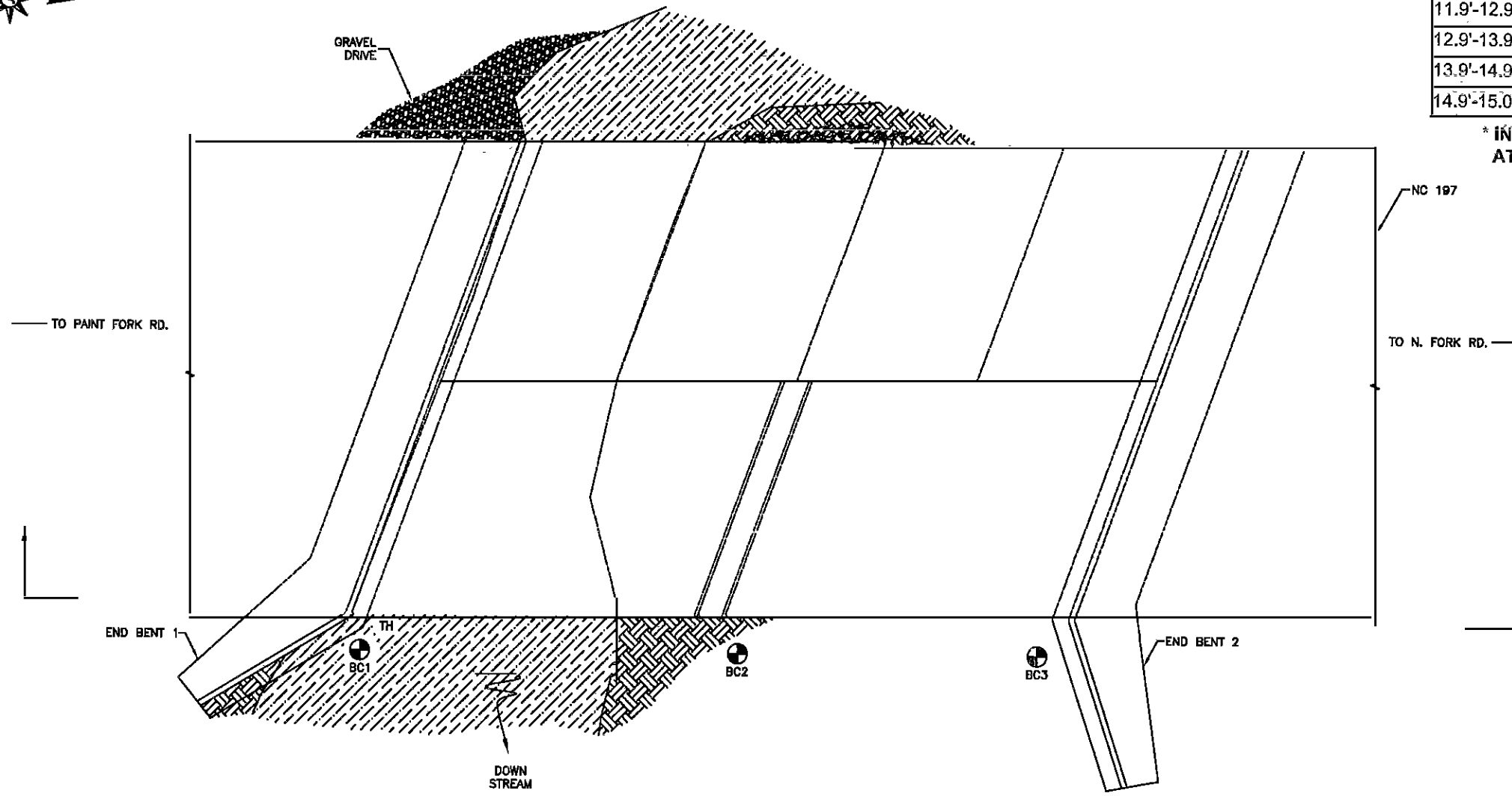


FDH Engineering, Inc. 2730 Rowland Rd., Raleigh, NC 27615

T: (919) 755-1012 F: (919) 755-1031



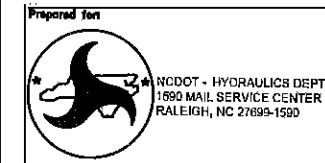
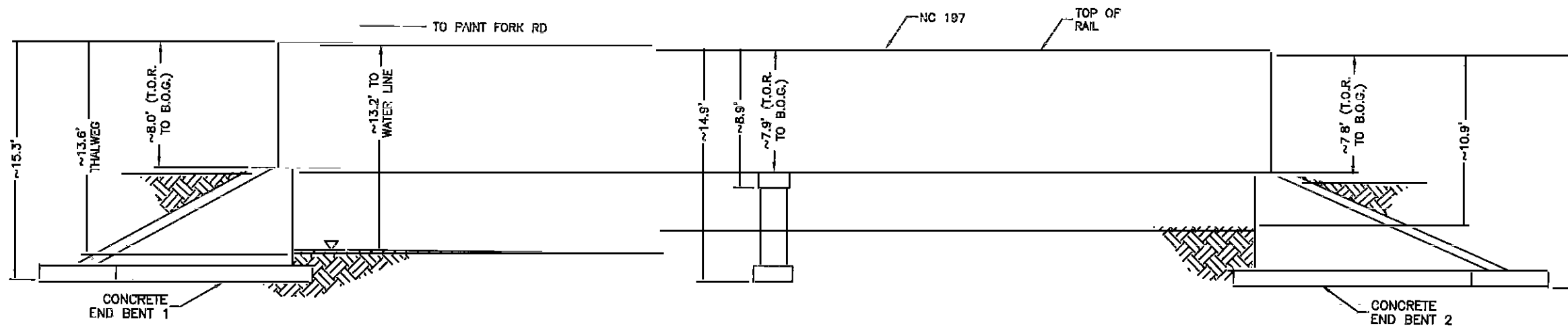
FOUNDATION PLAN
NTS



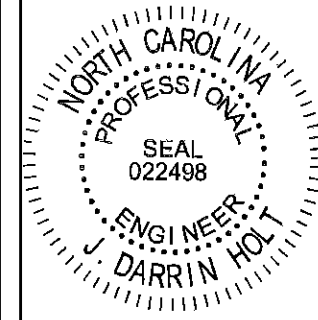
BLOW COUNT CHART					
BC1		BC2		BC3	
DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF	DEPTH (T.O.R.)	BPF
11.9'-12.9'	14	13.2'-14.2'	24	13.0'-14.0'	73
12.9'-13.9'	10	14.2'-15.2'	136	14.0'-15.0'	150
13.9'-14.9'	17	15.2'-15.3'	100/2"		
14.9'-15.0'	50/2"				

* INDICATES BOTTOM OF FOOTER AT LOCATION OF BLOW COUNT

ELEVATION
NTS



Prepared by
FDH ENGINEERING
2730 ROWLAND DRIVE
SUITE 100
RALEIGH, NC 27615
PHONE (919) 755-1012
FAX (919) 755-1031



SITE ID. #100078
DRAWN BY: CDJ
CHECKED BY: JDH
JOB NO. 08-08077E

SUBMITTALS		
DATE	DESCRIPTION	REV
04/02/08		A

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SITE NAME:
BUNCOMBE 78

SITE NUMBER:
#100078

SITE ADDRESS:
NC 197
BUNCOMBE COUNTY

SHEET TITLE
FOUNDATION PLANS

SHEET NUMBER

A-1

SCOUR PROJECT DATA FILE

For the NCDOT Bridge Maintenance Unit

County: _____ BUNCOMBE _____

Structure Number: _____ 100078 _____

CONTENTS

Scour Report Cover Letters
Depth Profile Computations
Unknown Pile Length Estimates
Scour Letters
Scour Project Worksheets
Closure Notifications
Information Change Notifications
Scour Report Revision Notices
Structure Replacement Notifications
Information Request Letters:
- Hydraulics Unit Request Letter
- Countermeasure Information Request
- Source Information Request
- Information Transmittal
- etc.
Other Letters and Information, etc

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: BUNCOMBE BRIDGE: 078 ROUTE: NC 197 STREAM CROSSED: N. FORK IVY CK
ASSESSMENT YES EVALUATION BY: JJB DATE 3/26/09

EHWA STRUCTURE INVENTORY & APPRAISAL CODES:

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

MONITORING:

PLAN REQUIRED? YES NO [checked]

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 [checked] FREQUENCY

COUNTERMEASURES:

PLAN REQUIRED? YES [] NO [checked]
SUMMARY OF PLAN:

[Blank lines for summary of plan]

CONSTRUCTION COMPLETED DATE

FINAL CODING AFTER WORK IS COMPLETED (ITEM 113) DATE

BRIDGE MAINTENANCE COMMENTS:

[Blank lines for bridge maintenance comments]



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

DATE: 06/22/10

MEMORANDUM TO: GARRY MOORE
DIVISION BRIDGE ENGINEER

FROM: DANIEL D. HOLDERMAN, PE
STATE BRIDGE MANAGEMENT ENGINEER
NCDOT-BRIDGE MANAGEMENT UNIT

SUBJECT : BRIDGE SCOUR INFORMATION (NOT SCOUR CRITICAL)

THE BRIDGE SCOUR EVALUATION/ASSESSMENT FOR BRIDGE NUMBE 78 IN BUNCOMBE COUNTY IS AVAILABLE FOR VIEWING ON THE WEBSITE *NCDOT BRIDGE DOCUMENT MANAGEMENT SYSTEM*. NOTE THAT THE BRIDGE IS NOT SCOUR CRITICAL AND NO COUNTERMEASURES OR SPECIAL MONITORING ARE REQUIRED.

IF YOU HAVE ANY QUESTIONS, PLEASE CALL DON IDOL AT 919-835-8226.

SPECIAL MONITORING? : NO

TYPE MONITORING : NONE

COUNTERMEASURES REQUIRED? : NO

TYPE COUNTERMEASURES : NONE

DATE WORK COMPLETED : N/A BY : N/A DIVISION BRIDGE ENGINEER

DDH / CC / PAW

CC : BRIDGE MAINTENANCE SUPERVISOR
AREA BRIDGE INSPECTION SUPERVISOR
T. S. EARP
JIM AHLMARK
SCOUR PROJECT DATA FILE

MAILING ADDRESS:
BRIDGE MANAGEMENT UNIT
1565 MAIL SERVICE CENTER
RALEIGH NC 27699-1565

TELEPHONE. 919-733-4362
FAX: 919-733-2348
WEBSITE *WWW.DOH.DOT.STATE.NC.US*

LOCATION:
4809 BERYL ROAD
RALEIGH NC

SQUAD A -- SCOUR REPORT FORM

SEARCH: 100078

BRIDGE ID: 100078 COUNTY: BUNCOMBE BRIDGE NO: 78 DIV: 13

EVALUATED BY: DOT DATE EVALUATED: MAR.26,2010 E/A: A

DATE RECVD BMU: MAY 20,2009 DATE SENT FIELD: JUN.22,2010

SUPERINTENDANT: GARRY MOORE FEDERAL AID: N

SYSTEM: 13

SCOUR CRIT?: NO GRADE: 5 TEAM: A

FC:

SPECIAL MONITORING: NO

TYPE MONITORING: NONE

WORK REQD?: NO

TYPE WORK: NONE

DATE WORK COMPLETE: NEW GRADE:

COMMENT: