



Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator



cc: Stuart
Ted
Bill Redfield
Ali

April 6, 2012



Town of Chatham
Board of Selectmen
549 Main Street
Chatham, MA 02633

Attn: Daniel L. Tobin, Director of Public Works

SUBJECT: NATIONAL BRIDGE INSPECTION STANDARDS (NBIS)
UNDERWATER BRIDGE INSPECTION

BRIDGE ST / MITCHELL RIVER
Bridge No. C-07-001
Structure No. C07001-437-MUN-NBI

Dear Mr. Tobin:

Enclosed for your information is a copy of an Underwater Inspection Report of 3/8/12 for the bridge that carries the BRIDGE ST over the MITCHELL RIVER.

A copy of the report is on file at our District 5 office located in Taunton. Please feel free to contact the District with any questions you may have concerning the bridge.

Sincerely,

Alexander K. Bardow, P.E.
Director of Bridges and Structures

REB/reb
cc: BBC
DHD, D-5
Enclosure

2-DIST 05 B.I.N. 437

UNDERWATER OPERATIONS TEAM
ROUTINE UNDERWATER INSPECTION REPORT

BR. DEPT. NO. C-07-001

CITY/TOWN CHATHAM	8-STRUCTURE NO. C07001-437-MUN-NBI	LEVEL OF INSPECTION II	93B-DATE INSPECTED MAR 8, 2012
07-FACILITY CARRIED HWY BRIDGE ST	ACCESS TO BRIDGE EMBANKMENT	UNDERWATER OPERATIONS ENGINEER RANDI E. BONICA <i>Randi E. Bonica</i>	
06-FEATURES INTERSECTED WATER MITCHELL RIVER	DEPTH 4 m	VISIBILITY 2 m	TEAM LEADER (DIVE MASTER) RANDI E. BONICA
BOTTOM CONDITION SAND, GRAVEL, SHELLS	CURRENT TIDAL	Report submitted by: <i>R. Bonica</i>	
TEAM MEMBERS G. BROZ, W. J. COLLERAN, B. FITZGERALD, E. P. TERNSKY			

ITEM 60		4	ITEM 61	4	ITEM 62	N
SUBSTRUCTURE		DEF	CHANNEL & CHANNEL PROTECTION	DEF	CULVERTS	DEF
1. Abutments	N		1. Channel Scour	7	1. Roof	N
a. Pedestals	N	-	2. Embankment Erosion	7	2. Floor	N
b. Bridge Seats	N	-	3. Debris	7	3. Walls	N
c. Backwalls	N	-	4. Vegetation	7	4. Headwall	N
d. Breastwalls	N	-	5. Utilities	7	5. Wingwall	N
e. Wingwalls	N	-	6. Rip-Rap/Slope Protection	7	6. Pipe	N
f. Slope Paving/Rip-Rap	N	-	7. Aggradation	7	7. Protective Coating	N
g. Pointing	N	-	8. Fender System	2	8. Embankment	N
h. Footings	N	-	a. Piles	N	9. Wearing Surface	N
i. Piles	N	-	b. Diagonal Bracing	N	10. Railing	N
j. Scour	N	-	c. Horizontal Bracing	3	11. Sidewalks	N
k. Settlement	N	-	d. Vertical Members	2	12. Utilities	N
l.	N	-	e. Fasteners	5	13. Member Alignment	N
2. Piers or Bents	N		f. Ladders	N	14. Deformation	N
a. Pedestals	N	-	9.	N	15. Scour	N
b. Caps	N	-	ITEM 59 SUPERSTRUCTURE		16. Settlement	N
c. Columns	N	-		N	17.	N
d. Stems/Webs/Pierwalls	N	-		N	18.	N
e. Pointing	N	-		N		
f. Footing	N	-		N		
g. Piles	N	-		N		
h. Scour	N	-		N		
i. Settlement	N	-		N		
j.	N	-		N		
k.	N	-		N		
3. Pile Bents	4			N		
a. Pile Caps	N	-		N		
b. Piles	4	S-A		N		
c. Diagonal Bracing	4	S-A		N		
d. Horizontal Bracing	4	S-P		N		
e. Fasteners	3	S-A		N		
		N		N		
UNDERMINING (Y/N)						N

DEFICIENCY REPORTING GUIDE

DEFICIENCY: A defect in a structure that requires corrective action.

CATEGORIES OF DEFICIENCIES:

M= Minor Deficiency- Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

S= Severe/Major Deficiency- Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

C-S= Critical Structural Deficiency- A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

C-H= Critical Hazard Deficiency- A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

URGENCY OF REPAIR:

I=Immediate- [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

A=ASAP- [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

P=Prioritize- [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

X=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED

CITY/TOWN CHATHAM	B.I.N. 437	BR. DEPT. NO. C-07-001	8-STRUCTURE NO. C07001-437-MUN-NBI	INSPECTION DATE MAR 8, 2012
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REMARKS

GENERAL REMARKS

Structure consists of eleven timber pile bents. Bents have a varied number of piles (see Plan View).

Orientation:

Bents are numbered from right (West) to left (East), looking downstream. Bents are numbered to be consistent with construction plans. Stub abutments are labeled left and right, looking downstream. Piles are lettered from upstream (North) to downstream (South). The draw span is between Bents #7A and #8.

Stub abutments are in the dry at low tide and were not inspected.

There is evidence of extensive marine borer damage to timber piles, bracing, and the fender system, mostly in the tidal zone.

ITEM 60 - SUBSTRUCTURE

Item 60.3 - Pile Bents

Item 60.3.b - Piles

A repair has previously been made to 12 piles (See sketch). This repair consists of wrapping piles with a plastic wrap held on by stainless steel bands. The wrap starts about 0.5' above the mudline and continues above the tidal zone. Most of the wrapped piles appeared to be of an older vintage.

Timber piles appear to be two different vintages. The older-looking piles are bleached above the tidal zone and have little or no creosote protection remaining. These piles are in poor condition with advanced brooming and signs of deterioration in the tidal zone. Newer-looking piles have much more creosote visible above the tidal zone. These piles are in fair condition with minor to moderate brooming in the tidal zone. All piles had heavy barnacle growth in the tidal zone. Below the tidal zone the piles had marine growth. Marine borer activity was previously noticed within the tidal zone in the piles that were wrapped. Most damage was visible at and in empty bolt holes through the piles. These holes were probably from deteriorated or removed bolts previously used to attach bracing to the piles. Some visible damage at the outside face of the piles due to marine borers was substantially greater than the original hole diameter. Some piles appeared to be partially hollow in the center of the pile at the open holes. Teredo worm activity was visible in numerous piles during this inspection. They are prevalent mostly in the barnacles in the tidal zone.

Item 60.3.c - Diagonal Bracing

There is diagonal bracing between Bents #2 and #3, Bents #5 and #6A, and Bents #8 and #9. Diagonal bracing has extensive deterioration in the lower ends of the timbers, in the tidal zone. Splits, marine borer damage, and holes are prevalent. Some bracing is broken or missing.

Item 60.3.d - Horizontal Bracing

There is some deterioration in the ends of the timber horizontal bracing at Bent #9.

Item 60.3.e - Fasteners

Fasteners used to attach bracing to the piles are in poor condition with up to 100% section loss in the tidal zone. Following the 2002 underwater inspection, divers placed bolts into the holes mentioned above. Some of these bolts had no threaded nuts installed due to the bracing blocking one side of the pile. The bolts were an attempt to limit access to the center of the piles by marine borers. Several of these bolts are severely deteriorated or missing.

ITEM 61 - CHANNEL AND CHANNEL PROTECTION

Item 61.5 - Utilities

At the upstream end of Bent #7 and #8 there is a cable encased in plastic pipe which is in good condition.

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REMARKS

Item 61.8 - Fender System

Horizontal timber members supporting the vertical timber fender members are attached directly to piles at Bent #7A and Bent #8. Newer pressure treated horizontal planks on either side of the vertical fender members hold the vertical timbers in place.

Item 61.8.c - Horizontal Bracing

There is extensive deterioration, splits, holes, and marine borer damage with up to 100% section loss in the timbers attached to the piles. This deterioration is in the tidal zone.

Item 61.8.d - Vertical Members

The vertical fender members have extensive deterioration and marine borer damage below the upper tidal zone. They are in critical condition with up to 100% section loss and would probably have failed if pressure treated planks were not added to both sides of the vertical timbers. The lower part of the vertical timbers are missing due to deterioration/marine borers.

Item 61.8.e - Fasteners

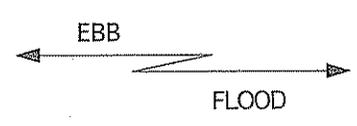
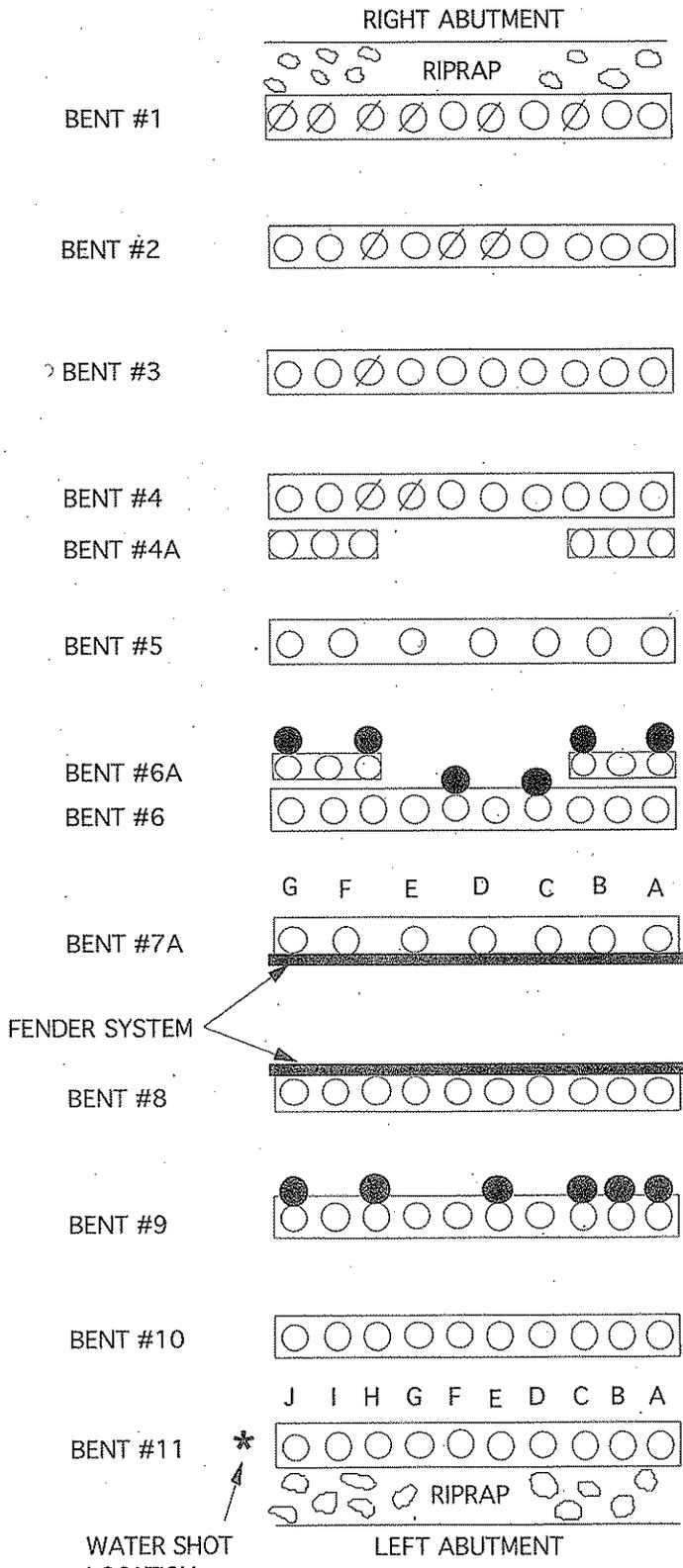
Fasteners have heavy surface rust and are deteriorated within the tidal zone.

Sketch / Chart Log

Sketch 1 : PLAN VIEW (NTS)
 Chart 1 : SCOUR MONITORING CHART (DOWNSTREAM END)
 Chart 2 : TIMBER PILE CONDITIONS
 Chart 3 : PILE CONDITION NOTES

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SKETCHES



- NOTES:
- BATTER PILE
 - ⊘ PILE WRAPPED WITH PLASTIC PRIOR TO 2005 INSPECTION
 - BENTS NUMBERED TO BE CONSISTENT WITH CONSTRUCTION PLANS.

Sketch 1: PLAN VIEW (NTS)

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CHARTS

SCOUR MONITORING CHART @ DOWNSTREAM END

	12/8/95	3/25/03	1/23/04	2/4/05	2/15/06	1/24/07	1/10/08
BENT #1	3.8'	4.6'	4.2'	4.0'	4.1'	4.1'	3.8'
BENT #2	5.1'	5.6'	5.4'	5.4'	5.7'	5.6'	5.3'
BENT #3	6.2'	6.6'	6.3'	6.4'	6.5'	6.4'	6.2'
BENT #4	7.6'	7.9'	7.9'	8.0'	8.2'	8.5'	8.0'
BENT #5	9.4'	10.8'	10.1'	10.2'	10.4'	10.6'	10.1'
BENT #6	10.2'	10.8'	10.7'	10.6'	11.0'	10.8'	10.5'
BENT #7A	10.3'	11.5'	11.3'	11.1'	11.2'	10.9'	11.0'
BENT #8	10.4'	11.2'	11.2'	11.1'	11.1'	10.9'	11.0'
BENT #9	8.9'	9.8'	9.8'	9.6'	9.7'	9.7'	9.6'
BENT #10	7.9'	8.2'	7.9'	8.0'	8.0'	8.0'	8.0'
BENT #11	4.6'	4.6'	4.7'	4.6'	4.5'	4.5'	4.6'
Y	5.5'	9.6'	4.6'	8.8'	6.2'	7.4'	6.4'
CORRECTION FACTOR	-	+4.1'	-0.9'	+3.3'	+0.7'	+1.9'	+0.9'

	1/8/09	1/6/10	3/8/12				
BENT #1	3.8'	3.9'	3.9'				
BENT #2	5.4'	5.7'	5.4'				
BENT #3	6.1'	6.6'	6.5'				
BENT #4	8.0'	7.7'	8.0'				
BENT #5	10.0'	10.2'	10.2'				
BENT #6	10.6'	10.9	11.0'				
BENT #7A	11.0'	11.1'	11.1'				
BENT #8	10.8'	11.1	10.9'				
BENT #9	9.4'	9.8'	8.9'				
BENT #10	8.0'	8.1'	8.2'				
BENT #11	4.5'	4.8'	4.5'				
Y	6.6'	7.7'	5.1'				
CORRECTION FACTOR	+1.1'	+2.2'	-0.4'				

Notes

1. Water control shot (Y) = Waterline to bottom of bent cap at downstream end of Bent #11.
2. For comparison all soundings are adjusted to 1995 water level.

Chart 1: SCOUR MONITORING CHART (DOWNSTREAM END)

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CHARTS

TIMBER PILE CONDITION

	PILE 'A'	PILE 'B'	PILE 'C'	PILE 'D'	PILE 'E'	PILE 'F'	PILE 'G'	PILE 'H'	PILE 'I'	PILE 'J'
BENT #1	2	2	W	1	W	1* ^T	W	W	W	W
BENT #2	1	1	1*	1	W	W	1	W	1	1*
BENT #3	1	1	1* ^T	1	2*	1	2	W	2	2*M
BENT #4	2	2	1* ^T	1	1	1	W	W	1	1* ^T
BENT #4A	1	1	1*	---	---	---	---	1	1	3
BENT #5	1	2	1	1	1* ^T	1	1	---	---	---
BENT #6A	1	1	1	---	---	---	---	1	1*M	1
			BAT 1*					BAT 1*M		BAT 1*M
BENT #6	1	1	3	1	1	2*	2	1	2	1
			BAT 1* ^T			BAT 1				
BENT #7A	1	2	1	1	1	1	1	---	---	---

CHANNEL

BENT #8	1	1	1	1	3* ^T	1	1	1	1* ^T	1
BENT #9	2	1	1	1	1	2* ^T	1	1	2	2
	BAT 1	BAT 2	BAT 2* ^T		BAT 1			BAT 1*		BAT 2* ^T
BENT #10	1	1	1	1	1	1	1	1	1	1
BENT #11	2* ^T	1	1* ^T	1* ^T	1* ^T	1* ^T	1* ^T	1* ^T	1* ^T	1

Chart 2: TIMBER PILE CONDITIONS

CITY/TOWN CHATHAM	B.I.N. 437	BR. DEPT. NO. C-07-001	8-STRUCTURE NO. C07001-437-MUN-NBI	INSPECTION DATE MAR 8, 2012
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CHARTS

General Notes:

1. Bents are numbered from right to left, looking downstream.
2. Piles are lettered from upstream to downstream.
3. Batter piles (B&T) are next to adjacent vertical pile.
4. Evidence of marine borer activity in the pile is indicated by (*).
5. Pile previously wrapped in plastic is indicated by (W).
6. General Condition of Piles:
 - Condition (1) Piles: Minor checks (<0.1' wide), delamination (<0.1' Pen)
 - Condition (2) Piles: Checks (0.1' wide), delamination (0.1' - 0.3' Pen)
 - Condition (3) Piles: Larger checks and splits, extensive delamination

Specific Notes:

1. Marine borer activity observed throughout the timber pile, from mudline to upper tidal zone. (Denoted by * in chart)
 - Bent #2 - Pile "C", Pile "J"
 - Bent #3 - Pile "E"
 - Bent #4A - Pile "C"
 - Bent #6A - Batter Pile "C"
 - Bent #6 - Pile "G"
 - Bent #9 - Batter Pile "H"
2. Marine borer activity observed in the tidal zone. (Denoted by *T in chart)
3. Marine borer activity at the mudline. (Denoted by *M in chart)
4. Condition (3) Piles:
 - Bent #4A - Pile "J", Split at top of pile, estimated 0.4' wide
 - Bent #6 - Pile "C", Saw-cut at top of pile, split above the cut to the cap
 - Bent #8 - Pile "E", 80% section loss due to marine borers, 1.5' - 2' diameter hole in tidal zone.

Chart 3: PILE CONDITION NOTES

