DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 55C0400
Facility Carried: EDINGER AVE
Location : 1.7 MI W/O BOLSA CHICA R
City :
Inspection Date : 02/24/2015
Inspection Type
Routine FC Underwater Special Other
X

Bridge Inspection Report

STRUCTURE NAME: BOLSA CHICA CHANNEL

CONSTRUCTION INFORMATION

Year Built : 1968
Year Widened: 1988
Length (m) : 92.4
Skew (degrees): 50
No. of Joints : 0
No. of Hinges : 0

Structure Description: Simply supported 15-span timber stringers (17 each) and a corrugated steel plate deck (Armco 12 gage) with 10-timber pile bents and 10-timber pile at west abutment and 11-tibmer pile at east abutment with timber sheathing walls.

Span Configuration : (W) 15 @ 6.1 m (E) c/c

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: UNKNOWN
Inventory Rating: RF=0.00 =>0.0 metric tons Calculation Method: FIELD EVAL/ENG JUDGMENT
Operating Rating: RF=0.00 =>0.0 metric tons Calculation Method: FIELD EVAL/ENG JUDGMENT
Permit Rating : XXXXX
Posting Load : Type 3: 0 U.S. Tons Type 3S2: 0 U.S. Tons Type 3-3: 0 U.S. Tons

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 0.4 m br, 7.5 m, 1.3 m sw, 0.3 m br (S).
Total Width: 9.0 m Net Width: 7.5 m No. of Lanes: 2 Speed: 45 mph
Min. Vertical Clearance: Unimpaired AC Thickness: 6.0 Inches
Rail Code: 0000

Rail Type	Location	Length (ft)	Rail Modifications
MBBR	Right/Left	3056	

DESCRIPTION UNDER STRUCTURE

Channel Description: Earth trapezoidal tidal channel with a rock slope at the westerly bank.

INSPECTION COMMENTARY

SCOPE AND ACCESS

All bents consist of a timber bent cap, ten timber piles and cross bracing. Bents 3 thru Bent 11 were submerged and inspected by diving access on this date. Abutments 1, Bent 2, Bents 12 thru 15, and Abutment 16 were in the dry at the time of inspection and were not inspected. Abutments 1, Bent 2, Bents 12 thru 15, and Abutment 16 can be inspected during periods of low water by the Area Bridge Maintenance Engineer (ABME).

The Underwater Inspection took place on the following dates from the Caltrans Dive boat:

February 12, 2015: Bents 3 thru 11 using Level I (Visual) and Level II (pattern cleaning) methods.

February 25, 2015: Re-inspect Bents 3 thru 6 using Level III (detailed cleaning in problem areas) methods with special cleaning and measuring tools.

The UWI plan for this structure is dated 10/25/2011.

HISTORY

INSPECTION COMMENTARY

The first underwater investigation report was completed by A-PAC Marine Service Inc. in 1988 and resulted in a repair and retrofit project. The project work included replacing of 12 piles with spliced sections from 1 foot below the existing mudline to the bent cap, and wrapping all piles from mudline to above the tidal zone with polyethylene jackets to prevent further deterioration by marine borers attack.

Abutment 1 (west) was washed out beyond repair by a severe storm and channel run-off in 1992. The County of Orange instituted a repair contract and extended the bridge by one span. A new timber bent was constructed in place of the existing western abutment location and, a new timber abutment was constructed.

NUMBERING CONVENTION

This report and all underwater inspection reports from 2002 follow the standard SM&I numbering convention. Looking ahead on route from Abutment 1 towards Abutment 16. Abutment 1 is on the west side of the channel and Abutment 16 is on the east side of the channel. This convention is opposite to numbering established by the original structure plans. Due to the conflicting numbering convention, along with an addition of a structure span in 1992, care should be taken during the process of mapping and establishing pile deterioration and channel degradation history.

REVISIONS

Prior to this inspection, the Element Level Inspection (ELI) table for Element 206, Timber Column had 111 columns in Condition State 1, 20 columns in Condition State 2, 15 columns in Condition State 3, and 15 columns in Condition State 4. As of 2014, the Element Level Inspection (ELI) Core Elements have changed and new Defects have been added. The above Elements and Condition States (CS) will now change to reflect the new recording system. These columns will be referred to as piles in the text of this report. Defect 1140-Decay, Loss of Section, has been added to further quantify timber condition states in a tabular form.

NBI Item 41, Open-Closed has been changed to K: Closed to All Traffic

SUBSTRUCTURE

At the time of this inspection there was moderate to heavy encrusting marine covering 100% of the timber surface. Marine growth consisted mainly of mussels and barnacles with some soft growth intermittently mixed in. In general, the growth was approximately 50 mm thick below the splashed zone, and has tendency to thicken at the exposed timber section immediately below the polyethylene wrapping.
Underwater visibility during this inspection was between 0.0m and 0.3m. Variations in visibility changed due to tidal flow and pile cleaning.

All columns were in a protective polyethylene wrapping from above the high water mark to varying distances above the mudline. A cursory review of the stream cross sections history indicated that scouring activity had caused the previously buried timber section below the wrapping to become exposed.

Due to the unprotected exposure of the timber columns in Bents 3 thru 5 due to scour, significant section loss was found as detailed below.
The average timber column diameter, measured at the top of the column just under the bent cap was 12 inches or 113.76 sq in.

Bent 3

Summary: Element 206, 1 ea, CS 1 (Good); Element 1140, 9 ea, CS4 (Severe)

INSPECTION COMMENTARY

All of the timber piles were exposed below the polyethylene wrapping ranging from 0.75 m to 1.5m with the exception of Pile 10 which was covered to the mudline. This exposure is the result of local scour. All of the exposed piles have significant section loss. The deterioration has resulted in exterior section loss with a remaining solid circular section as follows:

Pile 1, 6.5 in dia, 33.19 sq in
Pile 2, 6.0 in dia, 28.44 sq in
Pile 3, 5.5 in dia, 23.9 sq in
Pile 4, 7.0 in dia, 38.71 sq in
Pile 5, 9.0 in dia, 63.99 sq in
Pile 6, 9.5 in dia, 71.3 sq in
Pile 7, 5.0 in dia, 19.75 sq in
Pile 8, 7.0 in dia, 38.71 sq in
Pile 9, 0.0 in dia, 0.0 sq in
Pile 10, 12.0 in dia, 113.76 sq in

Bent 4

Summary: Element 206, 2 ea, CS1 (Good); Element 1140, 8 ea, CS4 (Severe)

All of the timber piles were exposed below the polyethylene wrapping ranging from 0.5 m to 1.25m with the exception of Piles 7 thru 10 which were covered to the mudline. Piles 7 thru 10 were excavated beyond the bottom of the polyethylene wrapping to establish their condition. This exposure is the result of local scour. Piles 1 thru 8 have significant section loss. The deterioration has resulted in exterior section loss with a remaining solid circular section as follows:

Pile 1, 0.0 in dia, 0.0 sq in
Pile 2, 4.0 in dia, 12.56 sq in
Pile 3, 7.0 in dia, 38.48 sq in
Pile 4, 0.0 in dia, 0.0 sq in
Pile 5, 1.0 in dia, 0.79 sq in
Pile 6, 2.0 in dia, 3.14 sq in
Pile 7, 4.0 in dia, 12.56 sq in
Pile 8, 6.0 in dia, 28.27 sq in
Pile 9, 11.0 in dia, 95.03 sq in
Pile 10, 12.0 in dia, 113.76 sq in

Additionally, there is a noticeable sag in the profile grade of the deck and rail over Bent 4, left edge of deck.

Bent 5

Summary: Element 206, 1 ea, CS1 (Good); Element 1140, 9 ea, CS4 (Severe)

All of the timber piles were exposed below the polyethylene wrapping ranging from 0.25 m to 2.25m. This exposure is the result of local scour. All of the exposed piles have significant section loss. The deterioration has resulted in exterior section loss with a remaining solid circular section as follows:

Pile 1, 8.0 in dia, 50.26 sq in
Pile 2, 8.0 in dia, 50.26 sq in
Pile 3, 5.0 in dia, 19.63 sq in
Pile 4, 7.5 in dia, 44.17sq in
Pile 5, 7.5 in dia, 44.17sq in
Pile 6, 11.25 in dia, 103.86 sq in
Pile 7, 8.0 in dia, 50.26 sq in

INSPECTION COMMENTARY

Pile 8, 7.5 in dia, 44.17sq in
Pile 9, 0.0 in dia, 0.0 sq in
Pile 10, 5.0 in dia, 19.63 sq in

Bent 6 to Bent 11

All piles were encased in a protective polyethylene wrapping from above high water mark to the mudline. The structural condition of the timber piles was not determined due to the polyethylene wrapping obstructing the visual inspection of the timber piles. However, no gross problems were noticed and the deck over these bents showed no sign of settlement.

The bottom 1m of polyethylene wrapping must be removed from Bents 6 thru 16 so that a complete structural inspection of the lower column sections can be completed prior to opening the bridge to vehicular loading.

WATERWAY

The bank upstream and downstream is armored with small rip rap. However, 50 feet upstream of the bridge on the Abutment 1 bank, the RSP has slipped into the channel and the earth bank behind has eroded.

SCOUR

The 3/31/2008 scour investigation determined this structure to be stable for the assessed or calculated scour conditions and the NBI Item 113 coding, Scour Critical Bridges, was 5. The underwater investigation performed on this date did not find any conditions which contradict that determination. However, since any minor scour may result in exposing unwrapped piles to attack by marine borers, any future repair work shall take scouring potential into consideration.

SAFE LOAD CAPACITY

Due to the significant loss of section at Bent 3 and Bent 4, this bridge is recommended for closure to all traffic. After the detailed inspection and documentation was completed, Michael Johnson, Branch Chief of Office of Structure Maintenance and Investigation North (SMI-N), was called by Richard Hunt, Senior Bridge Engineer (SMI-N), to report the condition and recommendation for immediate closure. Michael Johnson informed Gedion Werrede, Area Senior, Office of Structure Maintenance and Investigation South office. On 2-24-2015, Michael B Johnson issued a Notice of Critical Finding and submitted by e-mail to Mr. Shane Silsby, Orange County Public Works and addressed to Phil Jones and Co Phung, Orange County Public Works. They were also called by Gedion Werrede to report the closure recommendation.
Edward Frondoso, PE, Orange County Public Works, along with other Orange County Public Works staff, met with Richard Hunt on site to discuss the structural problems and closure recommendation. Orange County Public Works personnel barricaded the bridge to block all traffic at 5:05 PM.

OPERATIONAL SIGNS

A silhouette type sign showing the existing posting is in place at both approaches to the bridge.

EXISTING POSTING

7 Ton Per Vehicle
11 Ton Per Semi-trailer Combination

INSPECTION COMMENTARY

14 Ton Per Full Truck and Full Trailer

RECOMMENDED POSTING

Close bridge to all vehicular traffic.

RECOMMENDATIONS

This bridge is to remain closed until the following recommendations are completed;

1. Remove the bottom 1m of the polyethylene wrapping from the piles in Bents 6 thru Abutment 16 so they can be inspected for structural soundness.

2. Repair or replace the deteriorated all piles as required to sustain traffic loading at the County required service level.

3. Provide a detailed traffic plan, repair plans and load calculations for approval prior to allowing vehicular traffic service.

UNDERWATER INVESTIGATION

Next Inspection	: 24-FEB-2020	Water Type	: 2 - Salt
Inspection Freq.:	60 months	Max. Water Velocity:	0.3 mps
Dive Type	: B - Routine UW	Max. Water Depth :	5 m
Dive Mode	: D - Surface supplied	Max. Visibility :	.3 m
Contractor	: N/A	Water Surface Elev.:	m
Contract No.	: N/A		
Supervisor	: Richard Hunt	Diver	: Dale Floyd
Tender	: Armin Groess	Backup Diver	: Dave Kendall

SUBSTRUCTURE INVESTIGATED

Location	Depth(m)	Vel(mps)	Channel	Substructure Description
Bent 3	3.8	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 4	5.0	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 5	5.3	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 6	3.5	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 7	3.0	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 8	3.0	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 9	2.5	0.2	Sandy mud	Timber bent with 10 timber piles
Bent 10	1.5	0.2	Sandy mud	Timber bent with 10 timber piles
Bent11	0.5	0.2	Sandy mud	Timber bent with 10 timber piles

Team Leader : Richard M. Hunt

Report Author : Richard M. Hunt

Inspected By : RM.Hunt

3-6-15

Richard M. Hunt (Registered Civil Engineer) (Date)

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