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 : 05/25/2016

Bridge Inspection Report

Inspection Type
Routine FC Underwater Special Other
X

STRUCTURE NAME: BOLSA CHICA CHANNEL

CONSTRUCTION INFORMATION

Year Built : 1968
Year Modified: 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 @ 20.00 feet (E) c/c

SAFE LOAD CAPACITY AND RATINGS

Design Live Load: UNKNOWN
Inventory Rating: RF=0.23 =>7.5 metric tons Calculation Method: ALLOWABLE STRESS
Operating Rating: RF=0.38 =>12.3 metric tons Calculation Method: ALLOWABLE STRESS
Permit Rating : XXXXX
Posting Load : Type 3: 7 U.S. Tons Type 3S2: 11 U.S. Tons Type 3-3: 14 U.S. Tons

DESCRIPTION ON STRUCTURE

Deck X-Section: (N) 1.30 feet br, 24.7 feet, 4.25 feet sw, 1.30 foot 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.

NOTICE

The bridge inspection condition assessment used for this inspection is based on the American Association of State Highway and Transportation Officials (AASHTO) Bridge Element Inspection Manual 2013 as defined in Moving Ahead for Progress in the 21st Century (MAP-21) federal law. The new element inspection methodology may result in changes to related condition and appraisal ratings on the bridge without significant physical changes at the bridge.

The element condition information contained in this report represents the current condition of the bridge based on the most recent routine and special inspections. Some of the notes presented below may be from an inspection that occurred prior to the date noted in this report. Refer to the Scope and Access section of this inspection report for a description of which portions of the bridge were inspected on this date.

INSPECTION COMMENTARY

SCOPE AND ACCESS

The water in the channel was about 12 ft deep through spans 2 to 10. Only spans 1, 12 through 15 were fully inspected, and span 11 is partially inspected from the south side only. The easterly spans 11 through 14 were heavily muddy. The rest of the bridge was inspected by binocular. Rain boot and walking stick are needed at the easterly spans. A follow up inspection will be conducted once an access is available to inspect the

INSPECTION COMMENTARY

substructure and superstructure elements in span 2 through 10.

NUMBERING CONVENTION

This report and all routine 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 at the west end, care should be taken during the process of mapping and establishing pile deterioration and channel degradation history.

SUBSTRUCTURE

A tree is growing under the east abutment north end.

SAFE LOAD CAPACITY

The load rating for this structure was calculated on 01/13/2011. An updated Load Rating Summary is archived on 10/07/2011. The Load rating Summary Sheet has verified the physical conditions assumed in the above referenced load rating calculation have not changed significantly.

EXISTING POSTING

Load capacity calculation dated 1/13/2011 indicate the safe load carrying capacity is as follows:
7 TON PER VEHICLE
11 TON PER SEMI-TRAILER COMBINATION
14 TON PER FULL TRUCK AND FULL TRAILER

WORK DONE

During the underwater investigation dated 02/24/2015, the inspection dining team found significant section loss at most of the timber piles in these bents as follows:

Bent 3: all of the exposed piles of bent #3 have significant section loss, piles 1 through 9.

Bent 4: all of the exposed piles of bent #4 have significant section loss, piles 1 through 8.

Bent 5: all of the exposed piles of bent #5 have significant section loss, piles 1 through 5 and 7 through 10.

Supplemented steel piles and steel bent caps were added to strengthen the deteriorated bents.

UNDERWATER INSPECTION
This is the last underwater inspection report that performed on 04/08/2015.

SCOPE AND ACCESS

INSPECTION COMMENTARY

This report is a supplemental to the underwater inspection report dated, February 25, 2015. A detailed cleaning in problem area using Level III methods with special cleaning and measuring tools was performed at Bent 3 thru Bent 5 on February 25, 2015. All columns at Bent 6 thru Bent 12 were covered with plastic wrapping down to the mudline and below during that time, and cannot be accurately inspected. The plastic covering had since been removed following the previous underwater inspection. This supplemental report is to document condition of newly unwrapped timber columns from Bent 3 thru Bent 12.

Due to the bridge closure, the dive boat was launched at the Huntington Harbor Yacth Club located at the corner of the Pacific Coast Highway and Warner Avenue.

NUMBERING CONVENTION

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SUBSTRUCTURE

All columns from Bent 6 thru Bent 12 had the protective polyethylene wrapping removed for inspection. The contract called for all wrapping from approximately three feet above the mudline down be completely removed. Most of the removal work conformed to this requirement.

At the time of this inspection there was moderate to heavy encrusting marine covering 100% of the remaining protective wrapping over the timber piles. 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.

Underwater visibility during this inspection was between 0.3 m and 1.0.m. Variations in visibility changed due to tidal flow and pile cleaning.

At the time of the inspection, timber columns previously under the protective polyethylene were under generally good condition. Most columns still have injected epoxy layer intact. A timber columns have weathering pattern on the surface area without measurable section loss. The most severe deterioration resulted in the timber column diameter being 30 mm less than the original diameter.

Bent 6

Summary: Element 206, 9 ea, CS 1 (Good); Defects 1140, 1 ea, CS2 (Fair)

The water depth was 2.5 m at Column 1 and 3.25 m at Column 10. Column 9 outer surface shown deterioration and section loss. The remaining diameter was 9 inches compared to 10 inches original diameter. The remaining columns were either encased in injected epoxy or shown light surface abrasion without any section loss.

Bent 7

INSPECTION COMMENTARY

Summary: Element 206, 10 ea, CS1 (Good)

The water depth was 2.5 m at Column 1 and 3.0 m at Column 10. Column 2 thru 7 still have protective wrapping in place from just above the mudline down. The diver was able to excavate down 18 inches to get pass the bottom of the wrapping to inspect the timber surface at Column 3. No deterioration was noted at the timber pile surface below the excavation. The remaining columns were either encased in injected epoxy or shown light surface abrasion without any section loss.

Bent 8

Summary: Element 206, 10 ea, CS1 (Good)

The water depth was 2.25 m at Column 1 and 3.0 m at Column 10. All wrapping was removed from every columns at this bent. Trenches of 12 inches deep were dug around each column. All timber columns were either encased in injected epoxy or shown light surface abrasion without any section loss.

Bent 9

Summary: Element 206, 10 ea, CS1 (Good)

The water depth was 1.5 m at Column 1 and 3.0 m at Column 10. The wrapping was completely removed from 1.0 m above the mudline downward at Column 1 thru 5, Column 9, and Column 10. All timber surface at these columns were either encased in injected epoxy or shown light surface abrasion without any section loss. Trenches of 12 inches deep were dug around each column. The wrapping was not removed from the mudline down at Column 6 thru 8. The diver excavated below the wrapping for inspection and found no deterioration or other defects.

Bent 10

Summary: Element 206, 9 ea, CS1 (Good); Defects 1140, 1 ea, CS2 (Fair)

The water depth was 1.25 m at Column 1 and 1.5 m at Column 10. All wrapping was removed from every columns at this bent. Trenches of 12 inches deep were dug around each column. All timber columns were either encased in injected epoxy or shown light surface abrasion without any section loss. Column 10 exhibited a spherical shape section loss of 150 mm just below the bottom of the remaining protective wrapping. This section loss is not expected to cause a significant reduction in column capacity.

Bent 11

Summary: Element 206, 10 ea, CS1 (Good)

The water depth was 0.5 m at Column 1 and 1.0 m at Column 10. All wrapping was removed from every columns at this bent. Trenches of 12 inches deep were dug around each column. All timber columns were either encased in injected epoxy or shown light surface abrasion without any section loss.

Bent 12

Summary: Element 206, 10 ea, CS1 (Good)

Bent 12 is in the tidal zone, and was in the dry during the time of inspection. All wrapping was removed from every columns at this bent. Trenches of 18 inches deep were dug around each column. All timber column surfaces exhibited original creosote treatment finish and no deterioration was noted.

INSPECTION COMMENTARY

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

The bridge was closed to all traffic due to significant deteriorations at Bent 3, Bent 4, and Bent 5, as detailed in the previous underwater inspection report.

EXISTING POSTING

7 Ton Per Vehicle
11 Ton Per Semi-trailer Combination
14 Ton Per Full Truck and Full Trailer

RECOMMENDATION

The timber columns from Bent 6 to Bent 12 were in overall good condition. The County of Orange was planning to open the bridge while keeping existing posting in place following completion of the retrofit works at Bent 3 thru 5. Bent 6 thru 12 should be able to handle the posting loads without any adverse effect on the structure.

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
30		Steel Deck-Orthotropic	3	832	sq.m	817	15	0	0
	1000	Corrosion	3	15		0	15	0	0
	510	Deck Wearing Surface-Asphalt	3	693	sq.m	693	0	0	0
(30) There were no significant defects noted.									
(30-1000) Rust is formed at the steel deck at the southerly elevation in spans 1 and 2 at the bottom.									
(30-510) There were no significant defects noted.									
111		Girder/Beam-Timber	3	1570	m	1475	74	21	0
	1140	Decay/Section Loss (Timber)	3	45		0	30	15	0

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
	1150		Check/Shake (Timber)	3	50		0	44	6	0

(111-1140)
There are some timber beams exhibit section loss as follow:

Span 1: timber girder 3, 9 and 14, each girder exhibits a 2 inches X 2 inches X 1 inch section loss.

Span 13: timber girder 14 exhibits a 1 inch X 1 inch X 1 inch section loss.

Most of the exterior girders exhibit checks.

(111-1150)
There are checks 4 ft long on average in the girders and the penetration depth percentage was estimated because of no closed access to the girders at the following locations:

Span 1: timber girders 4 exhibits a check that is between 5% to 50% penetration girder depth.

Span 11: timber girders 10, 11 exhibits a check that is between 5% to 50% penetration girder depth; and timber girders 17 each exhibits a check that is > 50% penetration girder depth.

Span 12: timber girders 3 exhibits a check that is between 5% to 50% penetration girder depth; and timber girders 9 and 17 each exhibits a check that is > 50% penetration girder depth.

Span 13: timber girders 6, 13 and 17 each exhibits a check that is between 5% to 50% penetration girder depth.

Span 14: stringers 3, 4, 5, 8, 12, 13, and 1, each exhibits a check that is between 5% to 50% penetration girder depth; and timber girder 17 exhibits a check that is > 50% penetration girder depth.

Span 15: timber girders 2, 5, 10, 12, 14, and 16, each exhibits a check that is between 5% to 50% penetration girder depth.

202			**Column-Steel**	3	10	each	10	0	0	0
	517		**Weathering Steel**	3	110	sq.m	110	0	0	0

(202)
There were no significant defects noted.

(202-517)
There were no significant defects noted.

206			**Column-Timber**	4	161	each	131	3	13	14
	1140		**Decay/Section Loss (Timber)**	4	30		0	3	13	14

(206)
There are

(206-1140)
The timber columns in Bent 3, 4, and 5 are deteriorated: 3 column lost section less the 10% than its diameter area, 3 columns lost sections less than 50% of its diameter area, 10 columns lost sections more than 50% of its diameter area, 9 columns lost sections more than 75% and 5 columns total section lost.

216			**Abutment-Timber**	4	28	m	28	0	0	0

(216)
There were no significant defects noted.

ELEMENT INSPECTION RATINGS AND COMMENTARY

Elem No.	Defect /Prot	Defect	Element Description	Env	Total Qty	Units	Qty in each Condition State St. 1	St. 2	St. 3	St. 4
231			Pier Cap-Steel	2	38	m	38	0	0	0
	517		Weathering Steel	2	95	sq.m	95	0	0	0

(231)
There were no significant defects noted.

(231-517)
There were no significant defects noted.

235			Pier Cap-Timber	3	199	m	189	10	0	0
	1150		Check/Shake (Timber)	3	10		0	10	0	0

(235)
There were no significant defects noted.

(235-1150)
Bent cap #4 exhibits a horizontal check, that is estimated between 5% to 50% penetration bent cap depth.

256			Slope Protection	3	1	ea.	1	0	0	0

(256)
There were no significant defects noted.

330			Railing-Metal	3	185	m	155	30	0	0
	1000		Corrosion	3	30		0	30	0	0

(330-1000)
The metal beam top member is rusted at the vertical steel posts.

WORK RECOMMENDATIONS

RecDate: 02/10/2011
Action : Sub-Replace
Work By: LOCAL AGENCY
Status : PROPOSED

EstCost:
StrTarget: 2 YEARS
DistTarget:
EA:

Replace all damaged and deteriorated piles as being indicated by AECOM report dated 1/13/2011 to restore the safe load capacity. As a consequence of these revisions, the calculated Sufficiency Rating is 31.6 and since the bridge is also "Structurally Deficient", it may qualify to be in the list for replacement within the Highway Bridge Rehabilitation and Replacement Program.

Team Leader : Ashraf Shenouda

Report Author : Ashraf Shenouda

Inspected By : A.Shenouda/KD.Henderson

11/23/16

Ashraf Shenouda (Registered Civil Engineer) (Date)

STRUCTURE INVENTORY AND APPRAISAL REPORT

********** IDENTIFICATION **********

(1) STATE NAME- CALIFORNIA 069
(8) STRUCTURE NUMBER **55C0400**
(5) INVENTORY ROUTE(ON/UNDER)- ON 150000000
(2) HIGHWAY AGENCY DISTRICT 12
(3) COUNTY CODE 059 (4) PLACE CODE 00000
(6) FEATURE INTERSECTED- BOLSA CHICA CHANNEL
(7) FACILITY CARRIED- EDINGER AVE
(9) LOCATION- 1.7 MI W/O BOLSA CHICA RD
(11) MILEPOINT/KILOMETERPOINT 0
(12) BASE HIGHWAY NETWORK- NOT ON NET 0
(13) LRS INVENTORY ROUTE & SUBROUTE
(16) LATITUDE 33 DEG 43 MIN 46.41 SEC
(17) LONGITUDE 118 DEG 04 MIN 14.84 SEC
(98) BORDER BRIDGE STATE CODE % SHARE %
(99) BORDER BRIDGE STRUCTURE NUMBER

******** STRUCTURE TYPE AND MATERIAL *********

(43) STRUCTURE TYPE MAIN:MATERIAL- WOOD OR TIMBER
TYPE- STRINGER/MULTI-BEAM OR GDR CODE 702
(44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA
TYPE- OTHER/NA CODE 000
(45) NUMBER OF SPANS IN MAIN UNIT 15
(46) NUMBER OF APPROACH SPANS 0
(107) DECK STRUCTURE TYPE- CORRUGATED STEEL CODE 6
(108) WEARING SURFACE / PROTECTIVE SYSTEM:
A) TYPE OF WEARING SURFACE- BITUMINOUS CODE 6
B) TYPE OF MEMBRANE- NONE CODE 0
C) TYPE OF DECK PROTECTION- NONE CODE 0

********** AGE AND SERVICE **********

(27) YEAR BUILT 1968
(106) YEAR RECONSTRUCTED 1988
(42) TYPE OF SERVICE: ON- HIGHWAY 1
UNDER- WATERWAY 5
(28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00
(29) AVERAGE DAILY TRAFFIC 1529
(30) YEAR OF ADT 2007 (109) TRUCK ADT 3 %
(19) BYPASS, DETOUR LENGTH 199 KM

********** GEOMETRIC DATA **********

(48) LENGTH OF MAXIMUM SPAN 6.1 M
(49) STRUCTURE LENGTH 92.4 M
(50) CURB OR SIDEWALK: LEFT 0.3 M RIGHT 1.2 M
(51) BRIDGE ROADWAY WIDTH CURB TO CURB 7.5 M
(52) DECK WIDTH OUT TO OUT 9.0 M
(32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 14.0 M
(33) BRIDGE MEDIAN- NO MEDIAN 0
(34) SKEW 50 DEG (35) STRUCTURE FLARED NO
(10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M
(47) INVENTORY ROUTE TOTAL HORIZ CLEAR 7.5 M
(53) MIN VERT CLEAR OVER BRIDGE RDWY 99.99 M
(54) MIN VERT UNDERCLEAR REF- NOT H/RR 0.00 M
(55) MIN LAT UNDERCLEAR RT REF- NOT H/RR 0.0 M
(56) MIN LAT UNDERCLEAR LT 0.0 M

********** NAVIGATION DATA **********

(38) NAVIGATION CONTROL- NOT APPLICABLE CODE N
(111) PIER PROTECTION- CODE
(39) NAVIGATION VERTICAL CLEARANCE 0.0 M
(116) VERT-LIFT BRIDGE NAV MIN VERT CLEAR M
(40) NAVIGATION HORIZONTAL CLEARANCE 0.0 M

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SUFFICIENCY RATING = 21.6
STATUS STRUCTURALLY DEFICIENT
HEALTH INDEX 96.9
PAINT CONDITION INDEX = N/A

********** CLASSIFICATION ********** CODE

(112) NBIS BRIDGE LENGTH- YES Y
(104) HIGHWAY SYSTEM- NOT ON NHS 0
(26) FUNCTIONAL CLASS- MINOR ARTERIAL URBAN 16
(100) DEFENSE HIGHWAY- NOT STRAHNET 0
(101) PARALLEL STRUCTURE- NONE EXISTS N
(102) DIRECTION OF TRAFFIC- 2 WAY 2
(103) TEMPORARY STRUCTURE-
(105) FED.LANDS HWY- NOT APPLICABLE 0
(110) DESIGNATED NATIONAL NETWORK - NOT ON NET 0
(20) TOLL- ON FREE ROAD 3
(21) MAINTAIN- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(22) OWNER- CITY OR MUNICIPAL HIGHWAY AGENCY 04
(37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

********** CONDITION ********** CODE

(58) DECK 8
(59) SUPERSTRUCTURE 7
(60) SUBSTRUCTURE 7
(61) CHANNEL & CHANNEL PROTECTION 7
(62) CULVERTS N

********* LOAD RATING AND POSTING ********* CODE

(31) DESIGN LOAD- UNKNOWN 0
(63) OPERATING RATING METHOD- ALLOWABLE STRESS 2
(64) OPERATING RATING- 12.3
(65) INVENTORY RATING METHOD- ALLOWABLE STRESS 2
(66) INVENTORY RATING- 7.5
(70) BRIDGE POSTING- > 39.9% BELOW 0
(41) STRUCTURE OPEN, POSTED OR CLOSED- P
DESCRIPTION- POSTED FOR LOAD

********** APPRAISAL ********** CODE

(67) STRUCTURAL EVALUATION 2
(68) DECK GEOMETRY 4
(69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N
(71) WATER ADEQUACY 4
(72) APPROACH ROADWAY ALIGNMENT 6
(36) TRAFFIC SAFETY FEATURES 0000
(113) SCOUR CRITICAL BRIDGES 5

********** PROPOSED IMPROVEMENTS **********

(75) TYPE OF WORK- REPLACE FOR DEFICIENC CODE 31
(76) LENGTH OF STRUCTURE IMPROVEMENT 92.4 M
(94) BRIDGE IMPROVEMENT COST $1,922,800
(95) ROADWAY IMPROVEMENT COST $384,560
(96) TOTAL PROJECT COST $3,230,304
(97) YEAR OF IMPROVEMENT COST ESTIMATE 2009
(114) FUTURE ADT 2667
(115) YEAR OF FUTURE ADT 2036

********** INSPECTIONS **********

(90) INSPECTION DATE 05/16 (91) FREQUENCY 12 MO
(92) CRITICAL FEATURE INSPECTION: (93) CFI DATE
A) FRACTURE CRIT DETAIL- NO MO A)
B) UNDERWATER INSP- YES 60 MO B) 04/15
C) OTHER SPECIAL INSP- NO MO C)