

*California Department of Transportation
Division of Maintenance*

Structure Maintenance and Investigations

B_{RIDGE}

I_{NSPECTION}

R_{ECORDS}

I_{NFORMATION}

S_{YSTEM}

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Photo No. 1

Looking down at corroded nuts on threaded rods at a splice plate for Column 1 of Bent 20



DEPARTMENT OF TRANSPORTATION
Structure Maintenance & Investigations

Bridge Number : 10 0136
Facility Carried: STATE ROUTE 1
Location : 01-MEN-001-43.74
City :
Inspection Date : 05/15/2012

Bridge Inspection Report

Inspection Type

Routine FC Underwater Special Other
 Other

STRUCTURE NAME: ALBION RIVER

CONSTRUCTION INFORMATION

Year Built : 1944 Skew (degrees): 0
Year Widened: N/A No. of Joints : 2
Length (m) : 295.4 No. of Hinges : 0

Structure Description: Simply supported 34-span bridge. Timber 2-ply plank deck, with AC riding surface, timber 17-stringer spans on timber A-frame deck trusses on timber tower bents. Eleven timber approach spans at the south end of the bridge, with Span 8 & 10 being a timber A-frame deck truss. A single-span riveted steel deck truss on RC tower bents over the main channel. Twenty-two timber approach spans at the north end of the bridge, with Span 14, 16, 18, 20, 22, 24, 26, 28, & 30 being a timber A-frame deck truss. Both abutments are RC buttress-type 3-column bents on spread footings. Foundations for Bents 2-10 & 27-34 are concrete pedestal-type spread footings, Tower 11-12 is on driven PC/RC piles and Tower 13-14 is on driven timber piles, Bents 15-26 are concrete pedestal-type footings on driven timber piles. (The main span is a riveted steel deck truss that was recycled from an old bridge that had been located on the South Fork of the Feather River approximately 1.5 mi. downstream of Bidwell Bar) All timber is treated Douglas Fir (from Washington State).

Span Configuration : 7 @ 5.79 m (19.0 ft.), 11.58 m (38.0 ft.), 5.79 m (19.0 ft.), 11.58 m (38.0 ft.), 5.03 m (16.5 ft.), 39.62 m (130.0 ft.), 5.03 m (16.5 ft.), 11.58 m (38.0 ft.), 5.79 m (19.0 ft.), 11.58 m (38.0 ft.), 4 @ 5.79 m (19.0 ft.)

LOAD CAPACITY AND RATINGS

Design Live Load: M-13.5 OR H-15
Inventory Rating: RF=0.95 =>30.8 metric tons Calculation Method: ALLOWABLE STRESS
Operating Rating: RF=1.58 =>51.2 metric tons Calculation Method: ALLOWABLE STRESS
Permit Rating : POOXX
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

DESCRIPTION ON STRUCTURE

Deck X-Section: 0.08 m (0.3 ft.) br, 0.30 m (1.0 ft.) wg, 7.92 m (26.0 ft.), 0.30 m (1.0 ft.) wg, 0.08 m (0.3 ft.) br
Total Width: 8.6 m Net Width: 7.9 m No. of Lanes: 2 Speed: 50 mph
Min. Vertical Clearance: Unimpaired
Rail Code: 0010 Rail Description: Timber railings on timber posts, with timber wheel guard in front

DESCRIPTION UNDER STRUCTURE

Channel Description: Wide, sandy bed on flat slope situated in bottom of relatively narrow canyon at outlet to the ocean. Tidally influenced; flow reversal. Bridge is on straight reach downstream of right bend, about 180 m from the outlet to the ocean.

INSPECTION COMMENTARY

SCOPE OF INVESTIGATION

This investigation concentrated on the condition of the sub-structure timber elements and the bolted connections. The inspection was conducted by members of the DSM&I Toll Bridges Climb Team. The concrete towers supporting the main span were not inspected due to adverse weather and time constraints.

SUBSTRUCTURE

The horizontal transverse beam at the base of the legs of Bent 27 has 0.16 to 0.32 inch wide cracks in its sides between Post/Leg 3 and Post/Leg 4. The wood around the cracks/splits is damp and the interior appears to be soft when poked with a knife or awl. (See photos No. 17 & 18, dated 10/06/11, in BIRIS.) The member was drilled with an auger bit and found to be decayed in the core. The condition was only present in the area between the vertical members. When the beam was drilled under the posts no decay was found.

The horizontal transverse beam at the base of the legs of Bent 29 has 0.16 to 0.32 inch wide cracks in its top between Post/Leg 1 and Post/Leg 2, and between Post/Leg 2 and Post/Leg 3. The wood around the cracks/splits is damp and the interior appears to be soft then poked with a knife or awl. (See photos No. 19 & 20, dated 10/06/11, in BIRIS.)

The bolted connections in the towers have historically been replaced by the District 01 Bridge Crew. Currently, on average approximately 50 to 70% of the nuts are failed due to corrosion from the marine environment. (See photos No. 1 thru 10, dated 05/15/12, in BIRIS.) Due to the amount hardware needing replacement, the district should consider having the work done by contract, which should cover replacement of all of the threaded rods and nuts. There are approximately 5,000 threaded rods with nuts that need replacement, 2,500 to 3,500 of which are failed.

The estimate is based on the following:

50 threaded rods with malleys and nuts in the top horizontal, 60 threaded rods with malleys and nuts at the intermediate horizontals, 8 threaded rods with malleys and nuts in the intermediate cross-bracing and 114 threaded rods with malleys and nuts in the bases.

This breaks down to the following:

Bents 2-3, 4-5, 6, 33-34, 100 total. Bents 15-16, 17-18, 19-20, 21-22, 23-24, 2,560 total (512 ea.). Bent 7-8, 178. Bent 9-10, 436. Bents 25-26 and 27-28, 888 total (444 ea.). Bent 29-30, 379. This sums up to 4,541. Estimate 5,000 threaded rods with malleys and nuts for contract purposes.

The bolted connections are acting as pins, as long as the threaded rods are in place the bridge is in sound condition. On the other hand, the nuts keep the threaded rods in place, when they fail there is the chance of the threaded rods coming out of the connection. The Bridge Crew should closely monitor the integrity of the connections and continue their part in the continued replacement effort until such time that a contract is let to replace the connection hardware.

At least 15 to 20% of the timber scabs at the connections of the legs/columns between each level have 0.25 to 0.5 inch wide splits where the threaded rods, malleys, and nuts have compressed and distorted the wood. (See photos 2, 7, & 9, dated 5/15/2012, in BIRIS.)

The steel straps located at every level, which connect/tie the timber legs/columns between each level to the ones above or below across the horizontal timber beams, have moderate to severe areas of corrosion. (See photos 1, 3, 5, 6, & 8, dated 5/15/2012, in BIRIS.)

INSPECTION COMMENTARY

RECOMMENDATIONS

Remove and replace the steel bolted connections and hardware (threaded rods, malleys, nuts, straps, etc.) and timber scabs throughout the entire timber sub-structure as necessary. Work By: Bridge Crew. Estimated cost: \$75,000.

Repair (remove and replace and/or supplement) all portions of the horizontal transverse beam at the base of the legs of Bent 27 & 29 where the wood is decayed in the interior. Portions of the members were drilled with an auger bit and found to be decayed in the core. Work By: Maintenance Contract. Estimated cost: \$150,000.

Team Leader : Tim Sandoval

Report Author : Tim Sandoval *Tim R. Sandoval*

Inspected By : T.Sandoval

5/23/13

Michael W. Johnson

Michael W. Johnson (Registered Civil Engineer) (Date)

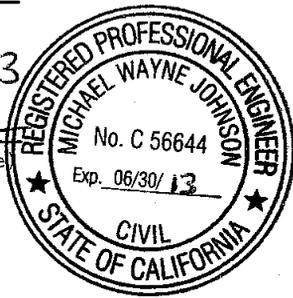




Photo No. 2
Looking down at the corroded nuts on the threaded rods at the third tier/level of Bent 21



Photo No. 3

Looking down at corroded nuts on threaded rods at a splice plate for Column 1 of Bent 21



Photo No. 4

Looking down at the corroded nuts on the threaded rods at the second tier/level of Bent 24



Photo No. 5

Looking down at corroded nuts on threaded rods at a splice plate for Column 1 of Bent 25



Photo No. 6

Looking down at the corroded nuts on the threaded rods at the third tier/level of Bent 25



Photo No. 7
Looking down at the corroded nuts on the threaded rods at the first tier/level of Bent 26



Photo No. 8

Looking down at corroded nuts on threaded rods at a splice plate for Column 4 of Bent 26



Photo No. 9

Looking down at the corroded nuts on the threaded rods at the fifth tier/level of Bent 26



Photo No. 10
Looking down at the corroded nuts on the threaded rods at the third tier/level of Bent 27