

## **Orange County Bridge Review Summary**

Dokken Engineering performed a field review of the Orange County bridge listed below in April 2017 to identify maintenance activities eligible for Caltrans' Bridge Preventive Maintenance Program (BPMP), dated December 2015, funding. Additional maintenance activities, if present, not eligible for BPMP funding were also noted. Maintenance recommendations, if noted in the most recent Caltrans Bridge Inspection Report (BIR), were confirmed.

**Bridge Number:** 55C0173

**Bridge Name:** Santiago Creek

**Year Built:** 1947

**Facility Carried:** Modjeska Canyon Rd

The Santiago Creek Bridge at Modjeska Canyon Road is a simply supported single span steel girder with reinforced concrete open end seat abutments supported on timber piles.

### **Caltrans BIR recommendations:**

- Repair spalls and seal deck with methacrylate.

### **Field Inspection Observations**

- Chained deck to check for delamination. Minor delamination found, recommend repairing.
- Light rust (mill scale) on girders. Recommend monitoring. No work necessary at this time.
- Drainage from the southeast house by the bridge is causing erosion issues. Recommend relocating drain.
- Concrete spall at abutment

### **Maintenance Needs Assessment**

#### **BPMP Assessment**

- Perform deck treatment per Caltrans BIR recommendation. Cracks are condition state 2, therefore eligible for funding.
- Relocate residential drain or provide minor rock protection.

#### **General Maintenance – Non-BPMP**

- Monitor rust on girders. Not a critical issue in foreseeable future.

### **Proposed BPMP Construction Costs**

- Repair spalled concrete
- Estimated Total deck treatment Construction Cost ≈ \$30,000 (with engineering, traffic control, mobilization and contingency)

### **Construction Costs Not Funded by BPMP**

- N/A

# **APPENDIX A**

## **Photos and BIR**



Photo 1: Santiago Creek Bridge



Photo 2:



Photo 3:



Photo 4: Abutment View



Photo 5: Bridge Girder



**DEPARTMENT OF TRANSPORTATION**  
Structure Maintenance & Investigations

Bridge Number : 55C0173  
Facility Carried: MODJESKA CANYON RD  
Location : .4 MI. E/O MODJESKA G RD  
City :  
Inspection Date : 09/18/2015

**Bridge Inspection Report**

Inspection Type  
Routine FC Underwater Special Other

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**STRUCTURE NAME:** SANTIAGO CREEK

**CONSTRUCTION INFORMATION**

Year Built : 1947 Skew (degrees): 0  
Year Widened: N/A No. of Joints : 0  
Length (m) : 17.1 No. of Hinges : 0

Structure Description: Simply supported single span steel girders (4 each) with RC open end seat abutments, all supported upon timber piles.

Span Configuration : (W) 1 @ 16.8 m (E) c/c

**SAFE LOAD CAPACITY AND RATINGS**

Design Live Load: M-13.5 OR H-15  
Inventory Rating: RF=0.61 =>19.8 metric tons Calculation Method: LOAD FACTOR  
Operating Rating: RF=1.02 =>33.0 metric tons Calculation Method: LOAD FACTOR  
Permit Rating : 00000  
Posting Load : Type 3: Legal Type 3S2: Legal Type 3-3: Legal

**DESCRIPTION ON STRUCTURE**

Deck X-Section: (S) 0.1 m br, 0.9 m cu, 7.3 m, 0.5 m cu, 0.1 m br (N)  
Total Width: 8.8 m Net Width: 7.3 m No. of Lanes: 2 Speed: 25 mph  
Min. Vertical Clearance: Unimpaired Overlay Thickness: 0.0 Inches  
Rail Code: 0000 Rail Description: Timber

**DESCRIPTION UNDER STRUCTURE**

Channel Description: Natural earth trapezoidal.

**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**

There was 3" deep and 2 ft wide running water in the channel; all elements were visually inspection by walking on the deck and under the bridge.

**SAFE LOAD CAPACITY**

A Load Rating Summary Sheet dated 10/30/2012 is on file for this structure. While this report does not include a check of that analysis, it does verify that the structural conditions observed during this inspection are consistent with those assumed in that analysis. The current rating is based on LF calculation.

**ELEMENT INSPECTION RATINGS AND NOTES**

Elem No.	Defect /Prot	Element Description	Env	Total Qty	Units	Qty in each Condition State	St. 1	St. 2	St. 3	St. 4
12		Deck-RC	2	150	sq.m	30	120	0	0	
1080		Delamination/Spall/Patched Area	2	1		0	1	0	0	
1130		Cracking (RC and Other)	2	59		0	59	0	0	
1190		Abrasion (PS Conc./RC)	2	60		0	60	0	0	

(12-1080)

There are 2 small 6" X 4" X 1/2" spalls in the deck at west end.

(12-1130)

The concrete deck exhibits few transverse cracks throughout deck, 1 mm wide and 3 ft spacing apart.

(12-1190)

There are abrasion and wearing of 75 % of the deck, the aggregate were exposed but remains secure in the concrete.

107		Girder/Beam-Steel	2	68	m	68	0	0	0	
515		Steel Coating-Paint	2	175	sq.m	0	90	85	0	
3410		Chalking (Steel PC)	2	175		0	90	85	0	

(107)

There were no significant defects noted.

(107-515-3410)

The paints are chalking and lost pigments at the edges.

215		Abutment-RC	2	18	m	18	0	0	0	
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(215)

There were no significant defects noted.

228		Pile-Timber	2	1	ea.	1	0	0	0	
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(228)

The pile element is included to indicate the presence of piles on this structure. The piles were not exposed for visual inspection. No indication of pile distress was noted in any substructure element.

332		Railing-Timber	2	36	m	36	0	0	0	
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(332)

There were no significant defects noted.

**WORK RECOMMENDATIONS**

RecDate: 05/12/2011

Action : Deck-Methacrylate

Work By: LOCAL AGENCY

Status : PROPOSED

EstCost:

StrTarget: 2 YEARS

DistTarget:

EA:

Repair the spalls and provide deck

sealing with methacrylate or equivalent material

**CHANNEL X-SECTION**


Side : Upstream

X-Section Date: 09/18/2015

Measured From :to bottom of beam

Location	Horiz (m)	Vert (m)	Comments
Abut 1	0.00	2.30	face of abut wall
	6.70	3.00	thalweg
Abut 2	0.00	1.45	face of abut wall.

Team Leader : Mikhael T. Zaarour  
Report Author : Mikhael T. Zaarour  
Inspected By : MT.Zaarour/DH.Kim

 10/21/15  
Mikhael T. Zaarour (Registered Civil Engineer) (Date)





**STRUCTURE INVENTORY AND APPRAISAL REPORT**

## \*\*\*\*\* IDENTIFICATION \*\*\*\*\*

(1) STATE NAME- CALIFORNIA 069  
 (8) STRUCTURE NUMBER 55C0173  
 (5) INVENTORY ROUTE(ON/UNDER) - ON 140000000  
 (2) HIGHWAY AGENCY DISTRICT 12  
 (3) COUNTY CODE 059 (4) PLACE CODE 00000  
 (6) FEATURE INTERSECTED- SANTIAGO CREEK  
 (7) FACILITY CARRIED- MODJESKA CANYON RD  
 (9) LOCATION- .4 MI. E/O MODJESKA G RD  
 (11) MILEPOINT/KILOMETERPOINT 0  
 (12) BASE HIGHWAY NETWORK- NOT ON NET 0  
 (13) LRS INVENTORY ROUTE & SUBROUTE  
 (16) LATITUDE 33 DEG 42 MIN 28.85 SEC  
 (17) LONGITUDE 117 DEG 37 MIN 43.93 SEC  
 (98) BORDER BRIDGE STATE CODE % SHARE %  
 (99) BORDER BRIDGE STRUCTURE NUMBER

## \*\*\*\*\* STRUCTURE TYPE AND MATERIAL \*\*\*\*\*

(43) STRUCTURE TYPE MAIN:MATERIAL- STEEL  
 TYPE- STRINGER/MULTI-BEAM OR GDR CODE 302  
 (44) STRUCTURE TYPE APPR:MATERIAL- OTHER/NA  
 TYPE- OTHER/NA CODE 000  
 (45) NUMBER OF SPANS IN MAIN UNIT 1  
 (46) NUMBER OF APPROACH SPANS 0  
 (107) DECK STRUCTURE TYPE- CIP CONCRETE CODE 1  
 (108) WEARING SURFACE / PROTECTIVE SYSTEM:  
 A) TYPE OF WEARING SURFACE- NONE CODE 0  
 B) TYPE OF MEMBRANE- NONE CODE 0  
 C) TYPE OF DECK PROTECTION- NONE CODE 0

## \*\*\*\*\* AGE AND SERVICE \*\*\*\*\*

(27) YEAR BUILT 1947  
 (106) YEAR RECONSTRUCTED 0000  
 (42) TYPE OF SERVICE: ON- HIGHWAY-PEDESTRIAN 5  
 UNDER- WATERWAY 5  
 (28) LANES:ON STRUCTURE 02 UNDER STRUCTURE 00  
 (29) AVERAGE DAILY TRAFFIC 1000  
 (30) YEAR OF ADT 2009 (109) TRUCK ADT 1 %  
 (19) BYPASS, DETOUR LENGTH 199 KM

## \*\*\*\*\* GEOMETRIC DATA \*\*\*\*\*

(48) LENGTH OF MAXIMUM SPAN 16.8 M  
 (49) STRUCTURE LENGTH 17.1 M  
 (50) CURB OR SIDEWALK: LEFT 0.9 M RIGHT 0.5 M  
 (51) BRIDGE ROADWAY WIDTH CURB TO CURB 7.3 M  
 (52) DECK WIDTH OUT TO OUT 8.8 M  
 (32) APPROACH ROADWAY WIDTH (W/SHOULDERS) 7.3 M  
 (33) BRIDGE MEDIAN- NO MEDIAN 0  
 (34) SKEW 0 DEG (35) STRUCTURE FLARED NO  
 (10) INVENTORY ROUTE MIN VERT CLEAR 99.99 M  
 (47) INVENTORY ROUTE TOTAL HORIZ CLEAR 7.3 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- NO CONTROL CODE 0  
 (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

## \*\*\*\*\* SUFFICIENCY RATING \*\*\*\*\*

SUFFICIENCY RATING = 44.4  
 STATUS  
 HEALTH INDEX 87.1  
 PAINT CONDITION INDEX = 50.5

## \*\*\*\*\* CLASSIFICATION \*\*\*\*\* CODE

(112) NBIS BRIDGE LENGTH- YES Y  
 (104) HIGHWAY SYSTEM- NOT ON NHS 0  
 (26) FUNCTIONAL CLASS- LOCAL RURAL 09  
 (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- COUNTY HIGHWAY AGENCY 02  
 (22) OWNER- COUNTY HIGHWAY AGENCY 02  
 (37) HISTORICAL SIGNIFICANCE- NOT ELIGIBLE 5

## \*\*\*\*\* CONDITION \*\*\*\*\* CODE

(58) DECK 6  
 (59) SUPERSTRUCTURE 8  
 (60) SUBSTRUCTURE 8  
 (61) CHANNEL & CHANNEL PROTECTION 8  
 (62) CULVERTS N

## \*\*\*\*\* LOAD RATING AND POSTING \*\*\*\*\* CODE

(31) DESIGN LOAD- M-13.5 OR H-15 2  
 (63) OPERATING RATING METHOD- LOAD FACTOR 1  
 (64) OPERATING RATING- 33.0  
 (65) INVENTORY RATING METHOD- LOAD FACTOR 1  
 (66) INVENTORY RATING- 19.8  
 (70) BRIDGE POSTING- EQUAL TO OR ABOVE LEGAL LOADS 5  
 (41) STRUCTURE OPEN, POSTED OR CLOSED- A  
 DESCRIPTION- OPEN, NO RESTRICTION

## \*\*\*\*\* APPRAISAL \*\*\*\*\* CODE

(67) STRUCTURAL EVALUATION 5  
 (68) DECK GEOMETRY 4  
 (69) UNDERCLEARANCES, VERTICAL & HORIZONTAL N  
 (71) WATER ADEQUACY 9  
 (72) APPROACH ROADWAY ALIGNMENT 6  
 (36) TRAFFIC SAFETY FEATURES 0000  
 (113) SCOUR CRITICAL BRIDGES 8

## \*\*\*\*\* PROPOSED IMPROVEMENTS \*\*\*\*\*

(75) TYPE OF WORK- CODE  
 (76) LENGTH OF STRUCTURE IMPROVEMENT M  
 (94) BRIDGE IMPROVEMENT COST  
 (95) ROADWAY IMPROVEMENT COST  
 (96) TOTAL PROJECT COST  
 (97) YEAR OF IMPROVEMENT COST ESTIMATE  
 (114) FUTURE ADT 1052  
 (115) YEAR OF FUTURE ADT 2035

## \*\*\*\*\* INSPECTIONS \*\*\*\*\*

(90) INSPECTION DATE 09/15 (91) FREQUENCY 24 MO  
 (92) CRITICAL FEATURE INSPECTION: (93) CFI DATE  
 A) FRACTURE CRIT DETAIL- NO MO A)  
 B) UNDERWATER INSP- NO MO B)  
 C) OTHER SPECIAL INSP- NO MO C)