EXHIBIT P

LEE COUNTY
SOUTHWEST FLORIDA

Miscellaneous Structural Engineering Services
Sanibel Bridge Beam Inspections

Bridge No. 124114 - Structure C Sanibel Causeway over San Carlos Bay

3rd Structure South of Toll Plaza

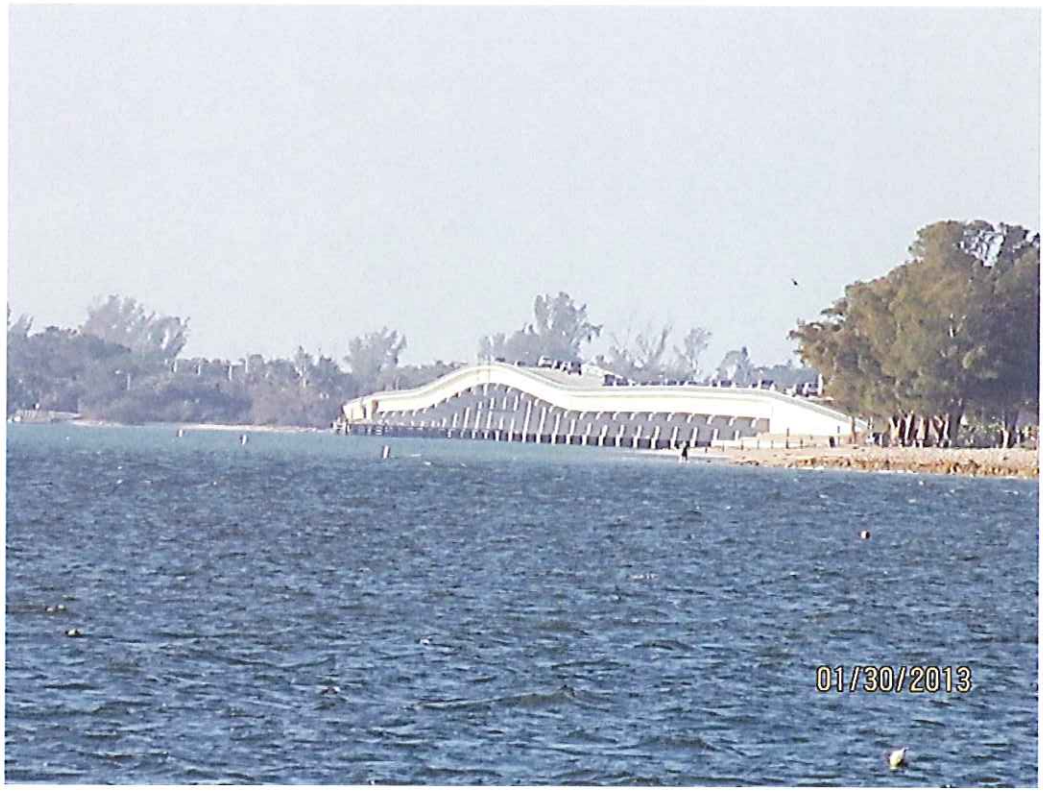
Prepared For:

Lee County

Prepared By:

T.Y. Lin International

January 2013



This report evaluates and makes recommendations of bridge maintenance for Bridge No. 124114 Sanibel Causeway over San Carlos Bay 3rd structure from toll plaza.
Solicit No.: CN-11-17 Contract No.: 5850

LEE COUNTY
SOUTHWEST FLORIDA

BRIDGE INSPECTION REPORT

PREPARED FOR: Lee County

SUBMITTED BY: T. Y. Lin International

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REPORT IDENTIFICATION

Bridge No. 124114

Bridge Name: Structure C Sanibel Causeway over San Carlos Bay

Location: 3rd Bridge South of Toll Plaza

NO	YES	
[X]	[ ]	This bridge contains fracture critical components.
[X]	[ ]	This bridge is scour critical.
[X]	[ ]	This report identifies deficiencies which require prompt corrective action.

Type of Inspection: [ ] Routine [ ] Interim [X] Special Evaluation – Beams Only

Field Inspection Date: Above Water 01/23/2013 Under Water N/A

Name of Inspector/Diver	Initials	PE Number	Certified Bridge Inspector Number
Charles W. Elliott (Lead)	CWE		00363
Kenneth F. Ulrich	KU		00288
Farszin Zafaranian	FZ	59558	
Emir Modarres	EMM	74130	

Reviewing Bridge Inspection Supervisor

Name Boon Chong P.E PE Number 48156 Initials BKC

Confirming Registered Professional Engineer

Name Boon Chong P.E 48156 Signature [signature] 5/6/2013

BOON KIM CHONG LICENSE No. 48156 STATE OF FLORIDA PROFESSIONAL ENGINEER

Lee County Condensed Bridge Inspection Report

Structure Name: Structure C Sanibel Causeway over San Carlos Bay

Location: 3rd Structure South of Toll Plaza

Prepared For: Lee County Transportation Department

Prepared By: T.Y. Lin International

Overall NBI Ratings

Note: The following ratings are from the Routine Inspection Report dated 11/17/2011.
Only the Superstructure was evaluated during this inspection that took place from 01/18/2013 to 01/23/2013.
No deficiencies were observed to warrant a change of the overall Rating of 7.

DECK = 7 Good
SUPERSTRUCTURE = 7 Good
SUBSTRUCTURE = 7 Good
CHANNEL = 7 Good
PERF. RATING: Good
SUFF. RATING: 79.0
HEALTH INDEX: 99.25

Note: Refer to chart on next page for Numerical Condition Rating Definitions

Scope:
The purpose of this Special Evaluation Inspection was to review and document deficiencies in the Beams/Girders of the Superstructure. The beam evaluations were performed over four days using the 50ft. Under Bridge Inspection truck by two CBI or PE qualified inspectors.

Summary:
The beams are in overall good condition. Several cracks which have a shear direction appearance were observed in the beams. These cracks primarily extend from the bearing areas and/or near the beam ends. The general appearances of the cracks in the exterior beams which are painted make the condition look worse than the cracks in the interior faces. The more significant lengths of cracking were marked with a permanent marker and dated 01/13.

Recommendations:
T. Y. Lin. recommends continuing to monitor the cracks in 6 months for any increase or growth in crack size. If findings show an increase in severity after the next inspection, then a repair recommendation would most likely be warranted.

NUMERICAL CONDITION RATING DEFINITIONS

Rating	Condition Category	Description
9	Excellent	
8	Very Good	No problems noted.
7	Good	Some minor problems. Minor maintenance may be needed.
6	Satisfactory	Structural elements show some minor deterioration. Major maintenance is needed.
5	Fair	All primary structural elements are sound but may have minor section loss, cracking, spalling, or scour. Minor rehabilitation may be needed.
4	Poor	Advanced section loss, deterioration, spalling, or scour. Major rehabilitation may be needed.
3	Serious	Loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present. Repair or rehabilitation required immediately.
2	Critical	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	Imminent Failure	Major deterioration or section loss present in critical structural components, or obvious loss present in critical structural components, or obvious vertical or horizontal movement affecting structural stability. Bridge is closed to traffic, but corrective action may be sufficient to put the bridge back in light service.
0	Failed	Bridge is out of service and is beyond corrective action. Replacement necessary.

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders:

The exterior face of Beams 1 and 4 have a paint system. There are some isolated areas of peeling paint, mostly adjacent to the cracks along the bottom flanges. Refer to Photo 1.

The poured beam end diaphragms have shrinkage cracks up to 0.020in. wide with some spalling. No exposed steel was evident.

The bottom flange has intermittent length longitudinal cracks that are less than 0.01in. wide throughout. These cracks are most evident in the exterior beams possibly from exposure to adverse weather conditions. Refer to Photo 2.

The underside of the top flange has transverse and isolated longitudinal cracks less than 0.010in. wide x up to full flange width (24in. long) with some having light efflorescence. Refer to Photo 3.

The beam webs have horizontal cracks less than 0.010in. wide and lengths up to 16in. extending from random beam ends and they are typically located near mid-height.

The beam webs typically have intersecting diagonal cracks which begin in or near the bearing area of the bottom flange extending up and away giving them a shear crack appearance. These cracks are less than 0.010in. wide and typically are less than 4ft. long. A few of the previously marked cracks in the 2007 inspection have increased up to 24in. in length; however, the cracks did not grow in width. Adjacent to these cracks are multiple shorter length diagonal, horizontal and some pattern/map style cracks, all being less than 0.010in. wide. There are random beams having longer and more evident diagonal/shear cracks from up to 10ft. long and less than 0.01in. wide. Several cracks were marked with a permanent black marker and dated 01/13 for future reference. Refer to Photos 4 and 5. Also refer to the charts on Pages 6 through 8 for crack quantities and the sketch on Page 10 showing typical crack locations.

A single diagonal crack less than 0.010in wide is present in a few beams in the upper web areas. These cracks begin near the upper portion of the beam end and extend down and away from the top flange varying in length from 6 1/2in. to 37in. Refer to Photo 6. Also refer to the chart on Page 9 for crack lengths and the sketch on Page 10 showing typical crack locations.

Non-Typical findings:

Beam 2-1 west face beginning 30ft. from north end along the top flange to deck juncture has a 0.025in. wide x 45ft. longitudinal crack. Refer to Photo 7.

Beam 4-4 east face at north end in addition to the adjacent diagonal/shear cracks has one crack which extends 8ft. from the beam end across the bottom face of the top flange and across the deck over hang. Refer to Photo 8.

Beam 5-1 west face at north end has a diagonal/shear crack beginning at the beam end and extending 15ft. to the south. Refer to Photo 9.

Pontis Element 109 - PS Concrete Girders (Continued):

Beam 6-4 west face at north end has a delamination on the bottom flange 30in. long x 12in. high. Refer to Photo 10.

Beam 7-4 east face at north end in addition to the typical cracks has one diagonal/shear crack 0.010in. wide x 10ft. long.

Beam 8-4 east face beginning 10ft. from the south end along the top flange to deck juncture has a longitudinal crack 0.030in. wide extending 46 1/2ft. to the north. Along this crack is minor edge spalls less than 1/4in. deep. Refer to Photo 11.

Beam 8-4 east face at north end has similar diagonal/shear cracks which were previously marked during the 2011 inspection. This crack has grown 7in. in length and the quantity has increased from four to six cracks. Refer to Photo 12.

Beam 11-4 east face at south end has one diagonal/shear crack less than 0.010in. wide which extends up to and across the underside of the top flange.

Beam 15-1 west face at south end has multiple (5) diagonal/shear cracks beginning within the bearing area/beam end. These cracks turn horizontally near the center of the web and are less than 0.010in. wide x up to 17ft. long.

Beam 22-4 east face at south end has multiple pattern/map cracks less than 0.10in. wide within 2ft. of the beam end. These cracks connect to the adjacent diagonal/shear cracks.

Pontis Element 109 - PS Concrete Girders (Continued):

The following charts are provided for future reference to track increase in quantities of the diagonal/shear cracks in the beam webs. Only the cracks which were well defined in direction were quantified.

BEAM	SOUTH END		NORTH END	
	WEST FACE	EAST FACE	WEST FACE	EAST FACE
1-1	3	4	4	4
1-2	4	5	2	1
1-3	4	4	4	3
1-4	4	5	2	4
2-1	3	3	5	3
2-2	3	2	3	5
2-3	4	3	3	3
2-4	3	4	3	5
3-1	4	5	3	2
3-2	4	4	5	3
3-3	3	3	3	3
3-4	4	5	2	3
4-1	6	1	8	3
4-2	1	1	0	2
4-3	2	1	1	1
4-4	3	6	2	3
5-1	4	0	7	3
5-2	1	1	3	1
5-3	2	1	1	1
5-4	2	4	3	5
6-1	4	0	4	0
6-2	2	1	2	0
6-3	2	3	2	2
6-4	2	5	2	3
7-1	4	0	4	0
7-2	0	0	1	0
7-3	0	0	0	3
7-4	0	3	3	5
8-1	3	1	3	2
8-2	3	2	4	2
8-3	2	3	0	3
8-4	3	5	4	6
9-1	6	3	4	0
9-2	3	0	3	3
9-3	3	3	1	0
9-4	3	3	2	4

Pontis Element 109 - PS Concrete Girders (Continued):

BEAM	SOUTH END		NORTH END	
	WEST FACE	EAST FACE	WEST FACE	EAST FACE
10-1	4	3	4	4
10-2	1	1	3	3
10-3	3	3	1	2
10-4	0	4	2	4
11-1	3	0	1	0
11-2	1	0	0	0
11-3	1	1	2	0
11-4	0	3	2	2
12-1	3	3	4	2
12-2	2	2	2	2
12-3	2	3	3	3
12-4	2	4	4	6
13-1	3	5	5	2
13-2	4	3	3	5
13-3	3	2	6	3
13-4	2	4	0	7
14-1	2	2	5	4
14-2	4	3	4	3
14-3	4	4	4	5
14-4	5	5	4	6
15-1	5	5	3	3
15-2	3	2	3	3
15-3	4	5	1	1
15-4	3	6	4	5
16-1	5	0	4	3
16-2	4	4	3	4
16-3	2	2	5	5
16-4	3	4	4	3
17-1	4	4	6	5
17-2	1	2	6	7
17-3	3	3	4	3
17-4	2	6	5	6
18-1	5	5	4	3
18-2	5	4	3	5
18-3	4	3	4	5
18-4	4	4	2	4
19-1	4	3	4	6
19-2	3	3	3	2
19-3	3	4	5	4
19-4	4	6	4	7

Pontis Element 109 - PS Concrete Girders (Continued):

BEAM	SOUTH END		NORTH END	
	WEST FACE	EAST FACE	WEST FACE	EAST FACE
20-1	4	2	5	4
20-2	1	0	3	4
20-3	2	3	3	6
20-4	3	5	3	4
21-1	4	3	4	2
21-2	2	5	4	2
21-3	2	4	5	5
21-4	4	5	3	4
22-1	5	4	6	5
22-2	4	5	3	5
22-3	5	5	4	5
22-4	6	7	4	7
23-1	4	4	4	4
23-2	3	0	4	4
23-3	4	5	3	3
23-4	5	6	4	6
24-1	5	2	4	3
24-2	2	4	4	4
24-3	2	2	3	3
24-4	3	5	3	5
25-1	6	3	5	3
25-2	4	3	2	2
25-3	2	1	4	5
25-4	1	5	4	5
26-1	6	3	4	6
26-2	3	3	5	4
26-3	3	3	4	4
26-4	3	5	3	6
27-1	5	2	4	2
27-2	3	3	3	2
27-3	2	4	1	2
27-4	2	5	3	5

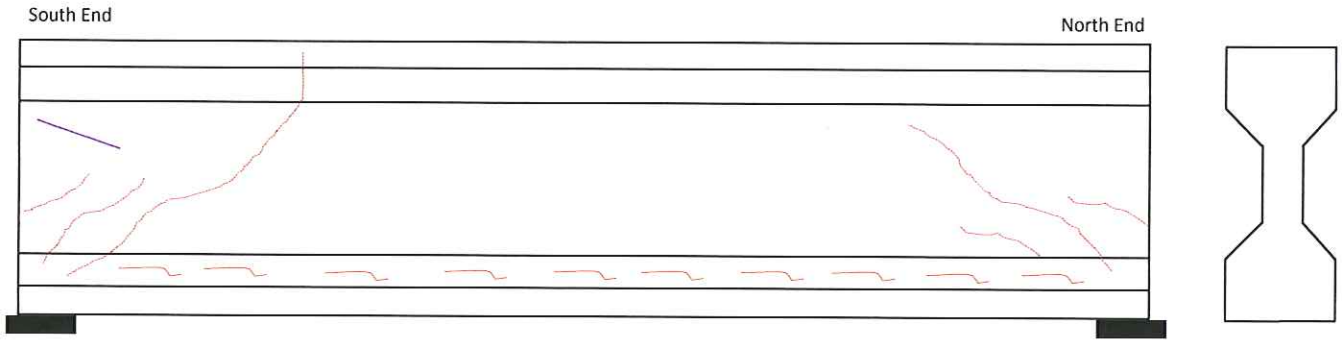
Pontis Element 109 - PS Concrete Girders (Continued):

The following chart is provided for future reference to track any crack length increases. These cracks begin in the upper portions of web area near the beam end and extend down and away.

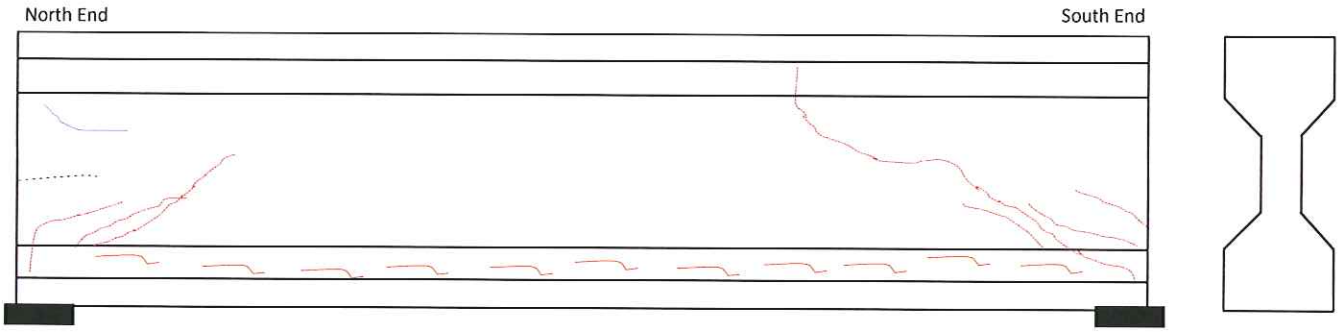
BEAM	SOUTH END		NORTH END	
	WEST FACE	EAST FACE	WEST FACE	EAST FACE
1-1		7in.		
1-4	11in.			
2-2	22in.	24in.		
3-1		22in.		
3-3	12in.	24in.		
4-4			7in.	
6-4	11 1/4in.			
7-1		26in.		
11-1		37in.		
11-2	21in.			
11-3	26in.	35in.		
11-4		33in.		
12-1				41in.
12-2		19in.		
21-1				32in.
22-4			9in.	
23-2	28in.			
27-4	20in.			
27-1		21in.		
27-2				6 1/2in.

BEAM SKETCHES

Note: The following shows the general direction and locations of the cracks in the beam webs and flanges:



East Elevation



West Elevation

Legend:

Blue line (- - - - -) indicates horizontal crack extending from beam end near mid height of web.

Gold line (solid) indicates short longitudinal cracks along bottom flanges.

Purple line (———) indicates diagonal cracks from top of web down and away.

Red Line (----------) indicate diagonal/shear cracks in beam webs extending from bearing areas or beam ends.

PHOTOS

Photo 1 – Typical areas of peeling paint (east face of Beam 25-4 at north end shown)

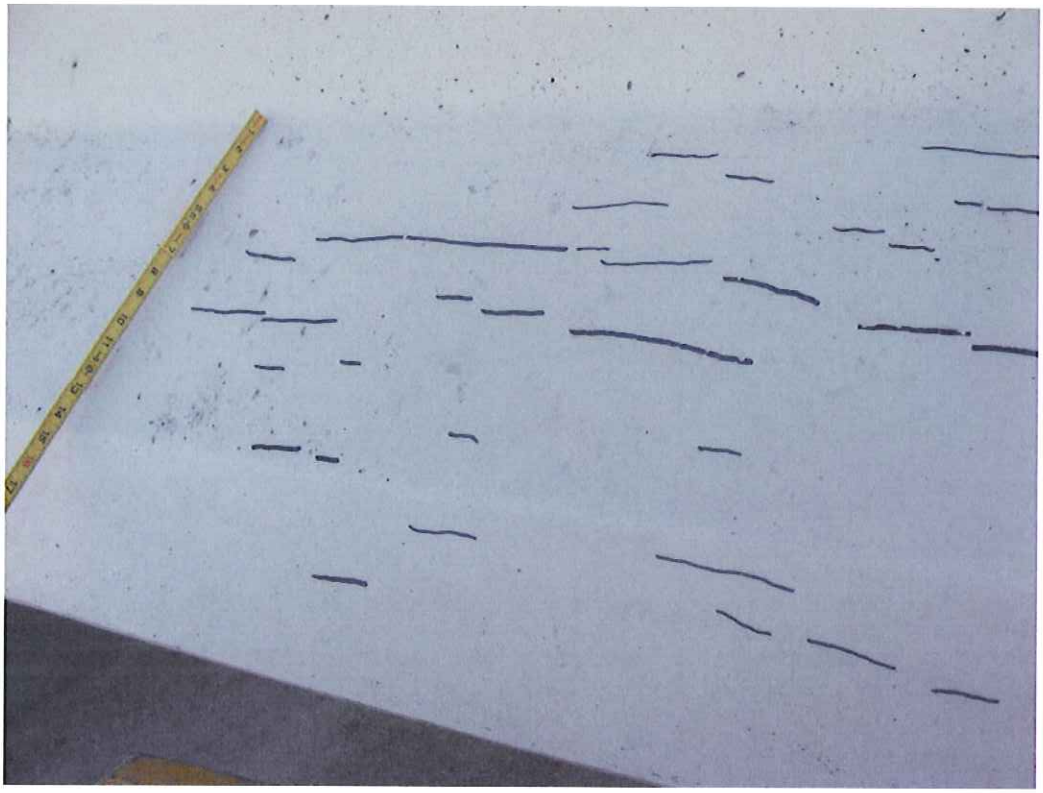


Photo 2 – Typical longitudinal cracks in the bottom flanges of the exterior faces

PHOTOS

Photo 3 – Typical of crack with light efflorescence in underside of the top flanges

Photo 4 – Typical diagonal/shear cracks in exterior beams extending from bearing areas

PHOTOS

Photo 5 – Typical width of diagonal/shear crack in beam webs near the bearing areas

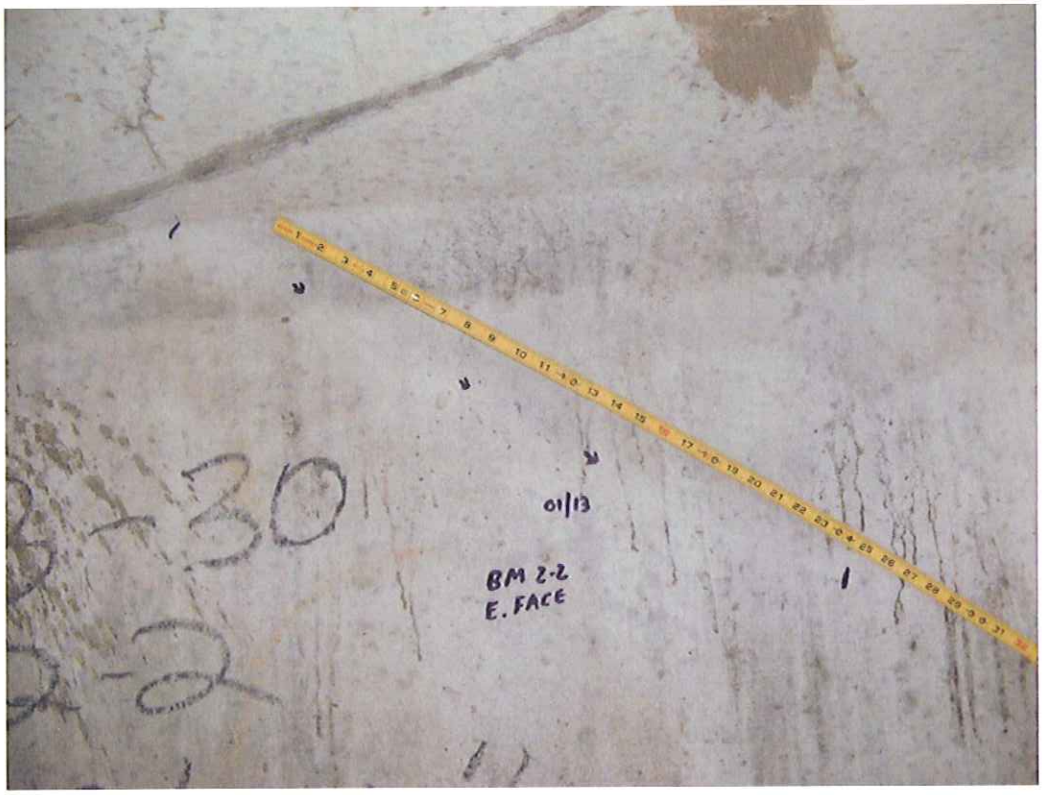


Photo 6 – Typical diagonal crack in beam web extending down and away from top flange

PHOTOS

Photo 7 – Longitudinal crack along west face of Beam 2-1 at web to top flange juncture

Photo 8 – Beam 4-4 east face north end diagonal crack across top flange and deck overhang

PHOTOS

Photo 9 – Beam 5-1 west face at north end diagonal/shear crack extending 15ft. to the south

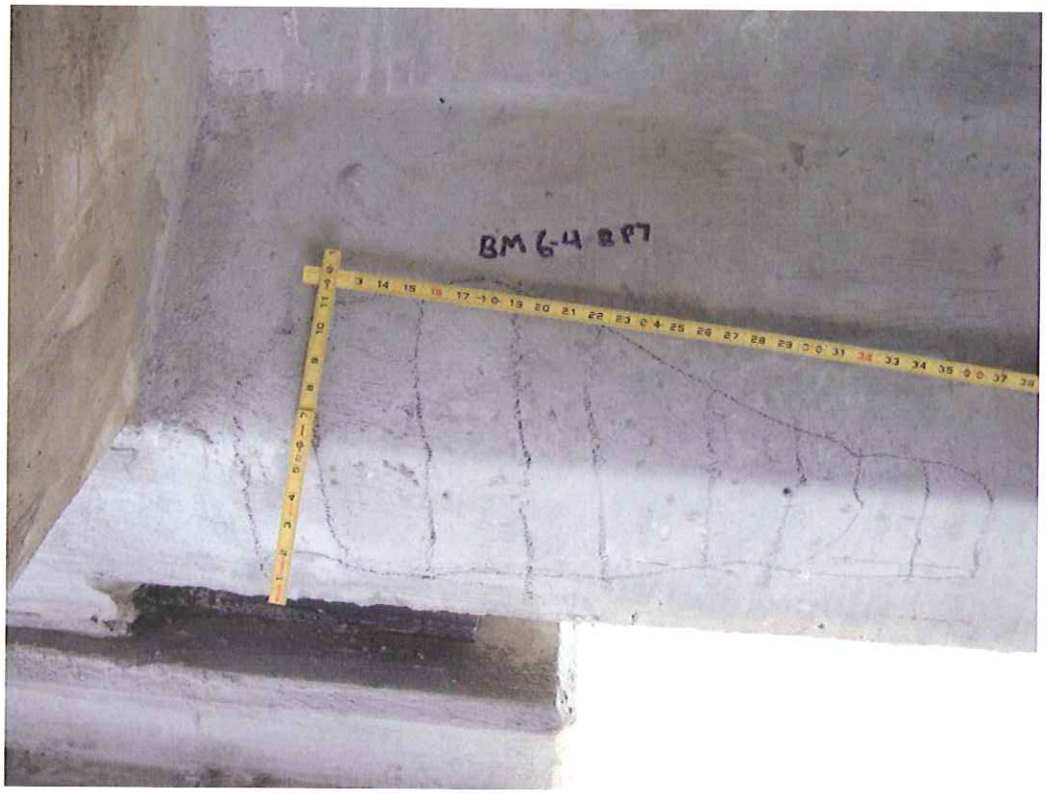


Photo 10 – Delamination on west face of Beam 6-4 at north end

PHOTOS

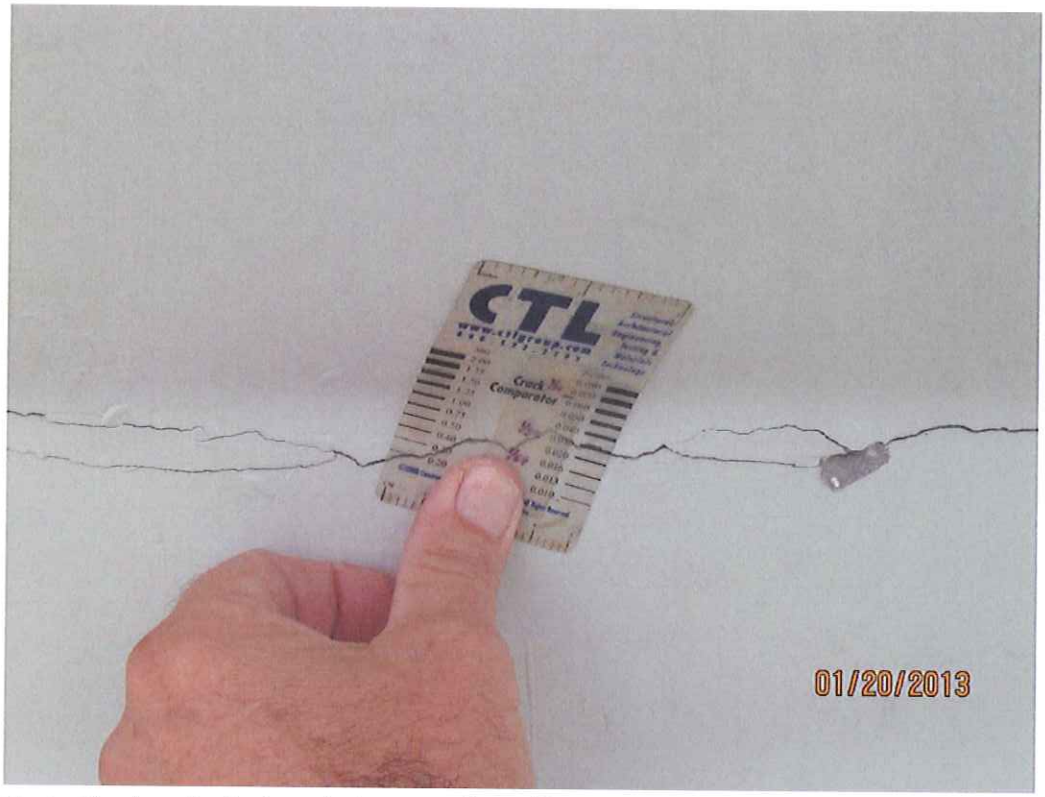


Photo 11 – Longitudinal crack along east face of Beam 8-4 at web to top flange juncture

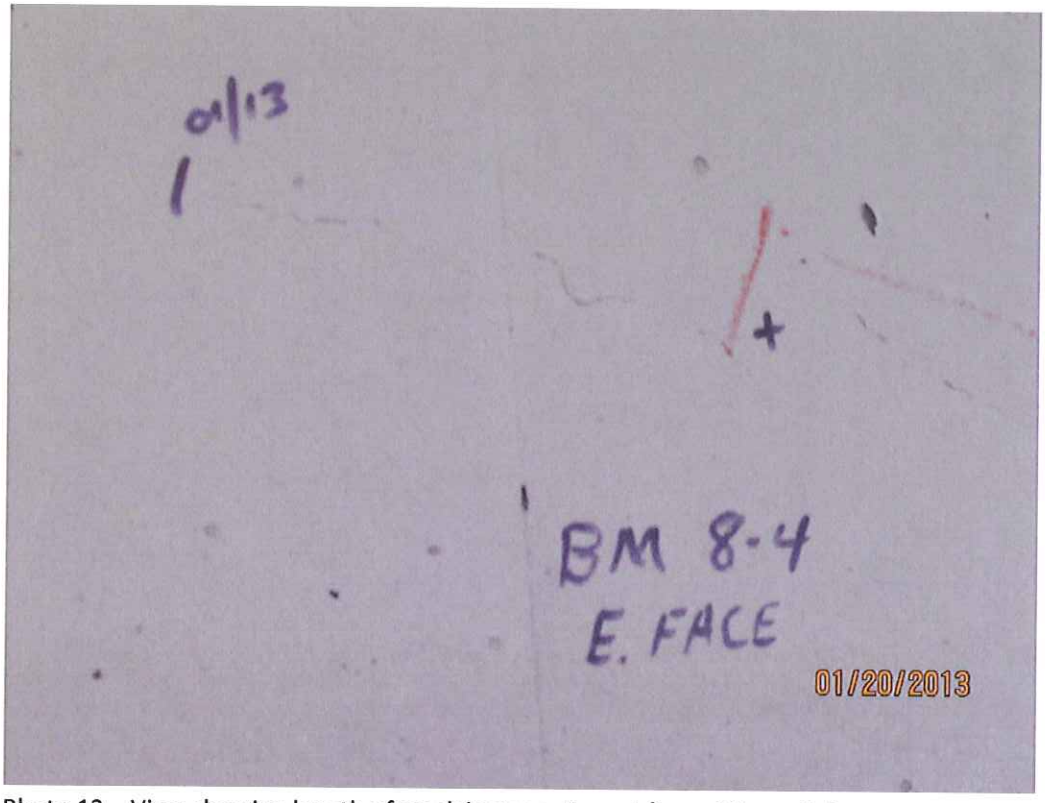


Photo 12 – View showing length of crack increase in east face of Beam 8-4

RECOMMENDED MAINTENANCE REPAIR AND REHABILITATION

Based on the findings of the bridge inspection from 1/18/2013 to 01/23/2013, the following actions are recommended:

(1) Continue to monitor cracks in the beams for any increase in severity by performing a follow up inspection in six months.
(2) Apply a protective coating over all cracks in the beam webs extending from beam ends.
(3) Repair 45ft. longitudinal crack along west face of Beam 2-1 at top flange to deck juncture beginning 30ft. from north end.
(4) Repair 46 1/2ft. longitudinal crack along east face of Beam 4-4 at top flange to deck juncture beginning 10ft. from south end.
(5) Repair 30in. x 12in. delamination in west face of Beam 6-4 bottom flange at the north end.