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

July 2013

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

BRIDGE INSPECTION REPORT

PREPARED FOR: Lee County

SUBMITTED BY: T. Y. Lin International

CONTENTS OF REPORT

* This section is not included in this report.

REPORT IDENTIFICATION

Bridge No. 124114

Bridge Name: Structure C Sanibel Causeway over San Carlos Bay

Location: 3rd Bridge South of Toll Plaza

NO	YES	
☒	☐	This bridge contains fracture critical components.
☒	☐	This bridge is scour critical.
☒	☐	This report identifies deficiencies which require prompt corrective action.

Type of Inspection: ☐ Routine ☐ Interim ☒ Special Evaluation – Beams Only

Field Inspection Date: Above Water 07/18/2013 Under Water N/A

Name of Inspector/Diver	Initials	PE Number	Certified Bridge Inspector Number
Charles W. Elliott (Lead)	CWE		00363
Kenneth F. Ulrich	KFU		00288
Farzin Zafaranian	FZ	59558	
Sandra Buitrago-Gutierrez	SBG		

Reviewing Bridge Inspection Supervisor

Name Boon Chong P.E PE Number 48156 Initials BBC

Confirming Registered Professional Engineer

Name Boon Chong P.E 48156 Signature 10/1/2013

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 7/12, 7/15 thru 7/18/2013.
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 Six Month Reevaluation Inspection since the January 2013 Special inspection was to review and document changes in crack quantities, length and width increases in the Beams/Girders of the Superstructure. The beam evaluation inspections were performed over five days using the 50ft. Under Bridge Inspection truck by two CBI or PE qualified inspectors.

Summary:
First inspection was performed in January 2013 which was during the cooler months. This inspection was performed during warmer conditions with the average temperature being in the high 80 to 90's. This may account for some of the increase in crack quantities and crack length increases.
The beams are in overall good condition. Several beam webs have diagonal cracks which have a shear direction appearance. These cracks primarily extend from the bearing areas and/or near the beam ends and extend south or north in direction. 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 and any additional length of cracking were marked with a permanent marker and dated 07/13.

Recommendations:
T. Y. Lin. recommends continuing to monitor the cracks for any increase and/ 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:

NOTE: Several cracks throughout all spans were marked with a permanent black marker and dated 07/13 for future reference. A few of the previously marked cracks in the 2007 and 01/2013 inspections have increased in length; however, the cracks did not grow in width.

The following conditions are typical throughout all spans.

- ✓ Beams 1 and 4 exterior faces are painted. There are some isolated areas of peeling paint, mostly adjacent to the cracks along the bottom flanges. Refer to Photo 1.
- ✓ Intermittent length longitudinal cracks in bottom flanges less than 0.010in. wide throughout. These cracks are most evident in the exterior beams possibly from exposure to adverse weather conditions. Refer to Photo 2.
- ✓ Transverse and longitudinal cracks in underside of the top flanges up to full flange width (24in. long) x less than 0.010in. wide with some having light efflorescence. Refer to Photo 3.
- ✓ Horizontal/longitudinal cracks in beam webs up to 16in. long x less than 0.010in. wide extending from the beam ends and typically located near mid-height.
- ✓ Intersecting diagonal cracks in beam webs in or near the bearing area of the bottom flange extending up and away giving them a shear crack appearance. These cracks are typically up to 4ft. long x 0.010in. wide. Adjacent to these cracks are multiple shorter length diagonal, horizontal and some pattern/map style cracks, all being less than 0.010in. wide. Random beams have longer and more evident diagonal/shear cracks up to 10ft. long x less than 0.010in. wide. Refer to Photos 4 and 5. Also refer to the charts on Pages 7 through 10 for crack quantities and the sketch on Page 12 showing typical crack locations.
- ✓ Single diagonal crack less than 0.010in. wide in 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 41in. Refer to Photo 6. Also refer to the chart on Page 11 for crack lengths and the sketch on Page 12 showing typical crack locations.

The following is considered incidental to the beams:

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

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

Non-Typical findings:

- Beam 2-1 west face of web along the top flange to deck juncture has a longitudinal crack 45ft. long x 0.025in. wide beginning 68ft. from south beam end and extends to 30ft. from north end. Refer to Photo 7.
- Beam 4-4 east face of web at north end, in addition to the adjacent diagonal/shear cracks web has one crack which extends 8ft. from the beam end across the bottom face of the top flange and across the deck overhang. Refer to Photo 8.
- Beam 5-1 west face of web at north end has a diagonal/shear crack beginning at the beam end and extending 15ft. to the south.
- Beam 5-1 west face of web at south end has multiple small length diagonal cracks up to 18in.long x 0.005in. wide. It was previously noted as having 4 cracks; however, 8 cracks were counted this inspection. Refer to Photo 9. (INCREASE)
- Beam 5-4 east face of web at north end, in addition to the adjacent diagonal/shear cracks web has one crack which extends 8ft. from the beam end across the bottom face of the top flange and across the deck overhang. Refer to Photo 8. (NEW)
- Beam 6-4 west face at top of web at south end has 4 diagonal cracks extending down and away from beam end. Refer to Photo 10. (NEW)
- Beam 6-4 west face of web at north end has a delamination on the bottom flange 30in. long x 12in. high. Refer to Photo 11.
- Beam 7-4 east face of web at south end and north end (previously noted at north end only) in addition to the typical cracks has one diagonal/shear crack 10ft. long x 0.010in. wide.
- Beam 7-4 east face of web at north end and north end in addition to the typical cracks has one diagonal/shear crack 10ft. long x 0.010in. wide. (NEW)
- Beam 8-1 east face of web 62in. from south end has a longitudinal crack which turns diagonal 84in. long x 0.010in. wide along the juncture to the top flange. (NEW) Refer to Photo 12.
- Beam 8-4 east face of web beginning 10ft. from the south end along the top flange to web 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. This crack turns diagonally and has extended 42in. longer across the underside of the top flange since the 01/13 inspection. Refer to Photo 13.
- Beam 8-4 east face of web at south end has two of five diagonal/shear cracks which extend up to 10ft. long. One crack also extends across the bottom face of the top flange and into the deck underside. (NEW)
- Beam 8-4 east face of web at north end has similar diagonal/shear cracks which were previously marked during the 2011 inspection. These cracks have not grown in length since the 01/13 inspection (previously noted as grown 7in.) and the quantity has not increased (previously noted as grown from four to six cracks in the 01/13 inspection). Refer to Photo 14.

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

- Beam 9-1 east face of web beginning 46in. from south end has two diagonal/shear cracks up to 36 1/2in. long x 0.05in. wide. (NEW)
- Beam 11-1 west face of web 8ft. from south end has one diagonal/shear crack less than 0.010in. wide which extends up to and across the underside of the top flange. (NEW)
- Beam 11-4 east face of web 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 11-4 east face of web at south end has a diagonal crack 2 ft. from beam end extending down and away from the top flange 25in. long x 0.005in. wide and a diagonal crack 4 ft. from beam end 20in. long x 0.005in. wide. Refer to Photo 15. (NEW)
- Beam 12-1 east face of web approximately 10ft. from the south end has a diagonal crack 88in. long x 0.010in. wide which turns longitudinal along the top flange juncture.
- Beam 13-4 east face of web at south end, cracks have grown up to 4ft. longer than the 01/13 markings. (INCREASE)
- Beam 13-4 west face of web approximately 10ft. from south end has a diagonal crack 54in. long x 0.010in. wide which turns longitudinal along the top flange juncture. (NEW)
- Beam 15-1 west face of web 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 up to 17ft. long x 0.010in. wide
- Beam 16-1 west face of web approximately 10ft. from the south end has a diagonal crack 23in. long x 0.010in. wide which turns longitudinal along the top flange juncture. (NEW)
- Beam 16-4 east face of web at south end has multiple diagonal/shear cracks beginning within the bearing area/beam end. These cracks turn horizontal near the center of the web up to 12ft. long x 0.010in. wide. (NEW)
- Beam 17-4 east face of web beginning 18ft. from north end at top flange juncture has a longitudinal crack 20ft. long x 0.020in. wide which turns diagonally 4ft. at the south end of the crack up to and across the top flange and into the deck underside. Refer to Photo 16. (NEW)
- Beam 22-4 west face of web at south end has similar multiple pattern/map cracks less than 0.10in. wide within 2ft. of the beam end. These cracks do not connect to the adjacent diagonal/shear cracks. (NEW)
- Beam 22-4 east face of web at south end has multiple pattern/map cracks less than 0.010in. wide within 2ft. of the beam end. These cracks connect to the adjacent diagonal/shear cracks. Refer to Photo 17.

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

NOTE: The following charts are provided for future reference to track any increase or reduction in quantities of the diagonal/shear cracks in the beam webs which typically extend up and away from the bottom flange and or bearing areas. Only the cracks which were well defined in direction were quantified.

= A reduction in crack quantities. This is mostly due to two or more cracks connecting together.

+ = Increase in cracks since previous inspection.

	SOUTH END					NORTH END			
	WEST FACE		EAST FACE			WEST FACE		EAST FACE	
BEAM	01/13/13	07/31/13	01/13/13	07/31/13		01/13/13	07/31/13	01/13/13	07/31/13
1-1	3	+ 5	4	# 3		4	4	4	4
1-2	4	# 3	5	# 4		2	2	1	1
1-3	4	4	4	4		4	4	3	3
1-4	4	4	5	5		2	2	4	4
2-1	3	3	3	3		5	5	3	3
2-2	3	3	2	2		3	3	5	5
2-3	4	4	3	3		3	3	3	3
2-4	3	3	4	4		3	3	5	5
3-1	4	4	5	5		3	3	2	+ 3
3-2	4	4	4	4		5	5	3	+ 4
3-3	3	3	3	3		3	3	3	3
3-4	4	4	5	5		2	2	3	3
4-1	6	6	1	1		8	8	3	3
4-2	1	1	1	+ 2		0	0	2	+ 3
4-3	2	2	1	1		1	1	1	+ 2
4-4	3	+ 4	6	6		2	2	3	3
5-1	4	4	0	+ 4		7	7	3	# 1
5-2	1	+ 4	1	1		3	3	1	+ 3
5-3	2	2	1	+ 2		1	+ 3	1	1
5-4	2	+ 3	4	+ 5		3	3	5	5
6-1	4	4	0	+ 1		4	4	0	+ 1
6-2	2	+ 3	1	+ 2		2	2	0	0
6-3	2	+ 3	3	3		2	2	2	+ 3
6-4	2	+ 3	5	5		2	+ 4	3	+ 4

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

	SOUTH END				NORTH END			
	WEST FACE		EAST FACE		WEST FACE		EAST FACE	
BEAM	01/13/13	07/31/13	01/13/13	07/31/13	01/13/13	07/31/13	01/13/13	07/31/13
7-1	4	4	0	+ 2	4	4	0	+ 2
7-2	0	+ 1	0	0	1	+ 2	0	+ 3
7-3	0	+ 3	0	+ 3	0	+ 2	3	3
7-4	0	+ 1	3	+ 5	3	3	5	5
8-1	3	+ 4	1	+ 3	3	3	2	+ 3
8-2	3	3	2	2	4	4	2	+ 3
8-3	2	+ 4	3	+ 4	0	+ 1	3	# 1
8-4	3	3	5	5	4	+ 5	6	6
9-1	6	6	3	3	4	+ 5	0	+ 2
9-2	3	3	0	+ 1	3	+ 4	3	+ 4
9-3	3	3	3	3	1	+ 3	0	+ 1
9-4	3	+ 4	3	3	2	+ 3	4	4
10-1	4	4	3	3	4	4	4	4
10-2	1	1	1	+ 2	3	+ 5	3	+ 4
10-3	3	3	3	# 2	1	+ 3	2	+ 3
10-4	0	0	4	4	2	+ 3	4	4
11-1	3	3	0	+ 1	1	1	0	0
11-2	1	1	0	+ 1	0	0	0	0
11-3	1	+ 2	1	+ 2	2	2	0	0
11-4	0	+ 1	3	3	2	2	2	+ 3
12-1	3	3	3	+ 4	4	4	2	2
12-2	2	2	2	2	2	+ 3	2	+ 3
12-3	2	2	3	3	3	3	3	3
12-4	2	+ 4	4	4	4	4	6	6
13-1	3	+ 5	5	5	5	5	2	+ 4
13-2	4	4	3	+ 4	3	+ 4	5	5
13-3	3	3	2	+ 3	6	6	3	3
13-4	2	2	4	4	0	0	7	# 4

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

	SOUTH END					NORTH END			
	WEST FACE		EAST FACE			WEST FACE		EAST FACE	
BEAM	01/13/13	07/31/13	01/13/13	07/31/13		01/13/13	07/31/13	01/13/13	07/31/13
14-1	2	+ 4	2	+ 3		5	5	4	4
14-2	4	+ 5	3	3		4	4	3	3
14-3	4	+ 5	4	4		4	4	5	5
14-4	5	+ 6	5	5		4	4	6	6
15-1	5	5	5	5		3	3	3	+ 4
15-2	3	+ 5	2	2		3	+ 6	3	+ 4
15-3	4	4	5	5		1	+ 2	1	+ 2
15-4	3	+ 4	6	6		4	4	5	5
16-1	5	5	0	+ 1		4	4	3	+ 4
16-2	4	4	4	+ 5		3	+ 4	4	4
16-3	2	+ 3	2	+ 3		5	5	5	# 4
16-4	3	+ 4	4	4		4	4	3	+ 6
17-1	4	4	4	+ 5		6	6	5	# 4
17-2	1	1	2	2		6	6	7	7
17-3	3	# 2	3	3		4	4	3	3
17-4	2	+ 3	6	6		5	5	6	6
18-1	5	5	5	5		4	4	3	3
18-2	5	5	4	# 3		3	+ 4	5	5
18-3	4	4	3	3		4	4	5	5
18-4	4	4	4	+ 5		2	2	4	4
19-1	4	4	3	+ 4		4	4	6	6
19-2	3	3	3	+ 4		3	3	2	+ 3
19-3	3	3	4	4		5	5	4	4
19-4	4	# 2	6	6		4	4	7	7
20-1	4	4	2	2		5	5	4	4
20-2	1	1	0	0		3	3	4	4
20-3	2	+ 4	3	3		3	3	6	# 5
20-4	3	+ 4	5	5		3	+ 4	4	4

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

	SOUTH END					NORTH END			
	WEST FACE		EAST FACE			WEST FACE		EAST FACE	
BEAM	01/13/13	07/31/13	01/13/13	07/31/13		01/13/13	07/31/13	01/13/13	07/31/13
21-1	4	4	3	3		4	4	2	2
21-2	2	2	5	# 4		4	4	2	2
21-3	2	2	4	4		5	# 4	5	5
21-4	4	4	5	+ 6		3	3	4	4
22-1	5	+ 7	4	4		6	+ 7	5	5
22-2	4	4	5	5		3	3	5	5
22-3	5	+ 6	5	+ 6		4	4	5	5
22-4	6	6	7	7		4	+ 5	7	7
23-1	4	+ 6	4	4		4	+ 5	4	4
23-2	3	3	0	0		4	4	4	4
23-3	4	4	5	5		3	3	3	3
23-4	5	5	6	+ 7		4	4	6	6
24-1	5	5	2	2		4	4	3	3
24-2	2	+ 4	4	# 3		4	4	4	4
24-3	2	2	2	+ 3		3	3	3	3
24-4	3	3	5	5		3	3	5	+ 6
25-1	6	6	3	3		5	5	3	3
25-2	4	4	3	# 2		2	2	2	2
25-3	2	+ 3	1	+ 2		4	4	5	5
25-4	1	+ 3	5	+ 6		4	4	5	5
26-1	6	6	3	3		4	4	6	6
26-2	3	3	3	3		5	5	4	4
26-3	3	3	3	3		4	4	4	+ 5
26-4	3	+ 5	5	5		3	3	6	6
27-1	5	# 3	2	2		4	# 3	2	2
27-2	3	# 2	3	+ 4		3	3	2	2
27-3	2	2	4	4		1	1	2	2
27-4	2	2	5	+ 6		3	3	5	5

CONDENSED INSPECTION REPORT

Pontis Element 109 - PS Concrete Girders (Continued):

The following chart is provided for future reference to track any length increases in the "diagonal" cracks which extend down and away from the top flanges, in the upper portions of the webs near the beam ends:

= NEW deficiency

* = Increase in length from 01/13 inspection

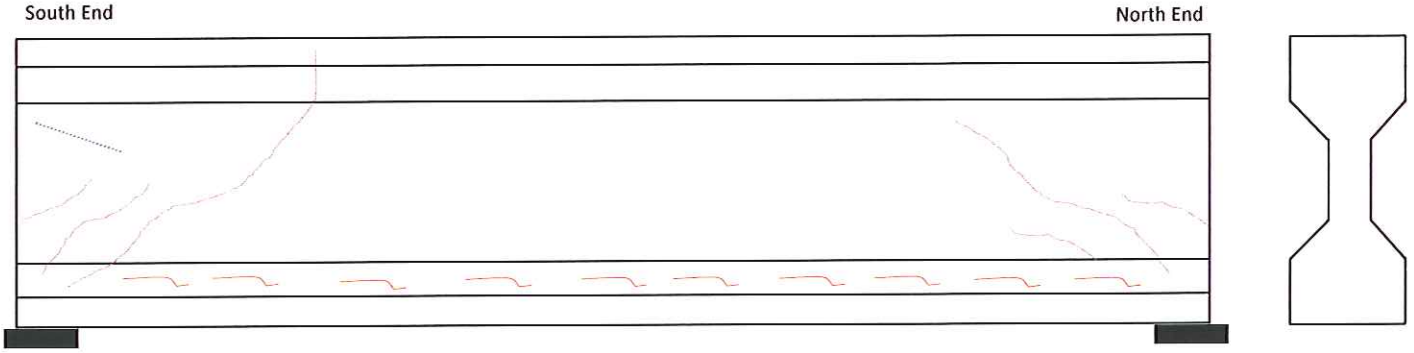
	SOUTH END					NORTH END			
	WEST FACE		EAST FACE			WEST FACE		EAST FACE	
BEAM	01/13/13	07/31/13	01/13/13	07/31/13		01/13/13	07/31/13	01/13/13	07/31/13
1-1			7in.						
1-4	11in.	* 22in.							
2-2	22in.		24in.						
2-4		# 16in.							
3-1			22in.						
3-3	12in.		24in.						
4-4						7in.			
6-4	11 1/4in.	# 26in.							
7-1			26in.						
10.4		# 17 1/2in.							
11-1			37in.						
11-2	21in.								
11-3	26in.		35in.						
11-4		# 33in.	33in.						
12-1								41in.	
12-2			19in.	* 26in.					
12-3		# 23in.							
18-4		# 24 1/2in.							
19-1				#20in.					
21-1								32in.	
21-4		# 17in.							
22-4						9in.			
23-2	28in.								
27-1			21in.						
27-2								6 1/2in.	
27-4	20in.								

Beam 1-4 has a second diagonal crack 18in. long located 31in. from south end.

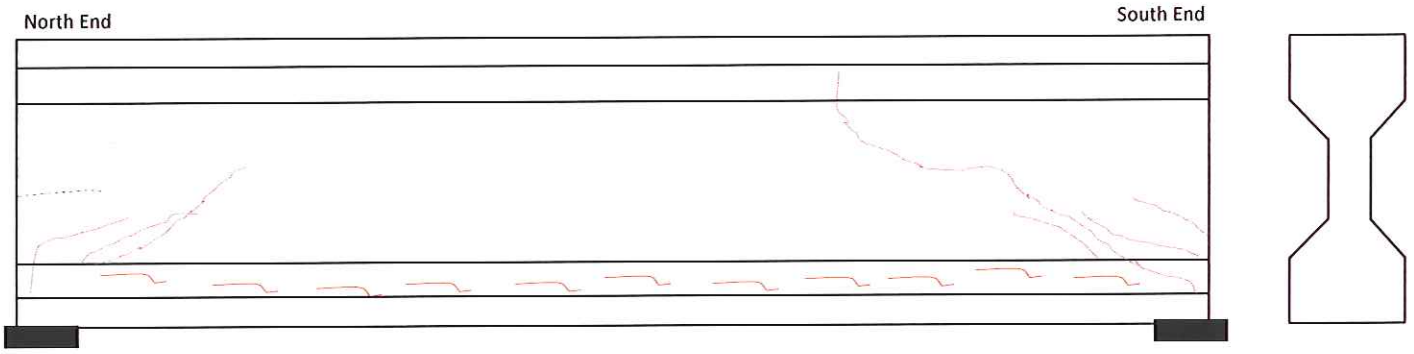
Beam 6-4 now has four diagonal cracks at top of web up to 26in. long.

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 minor areas of peeling paint on exterior beams

Photo 2 – Typical longitudinal cracks along bottom flange (Beam 7-1 shown)

PHOTOS

Photo 3 – Typical location of longitudinal cracks in bottom face of top flange

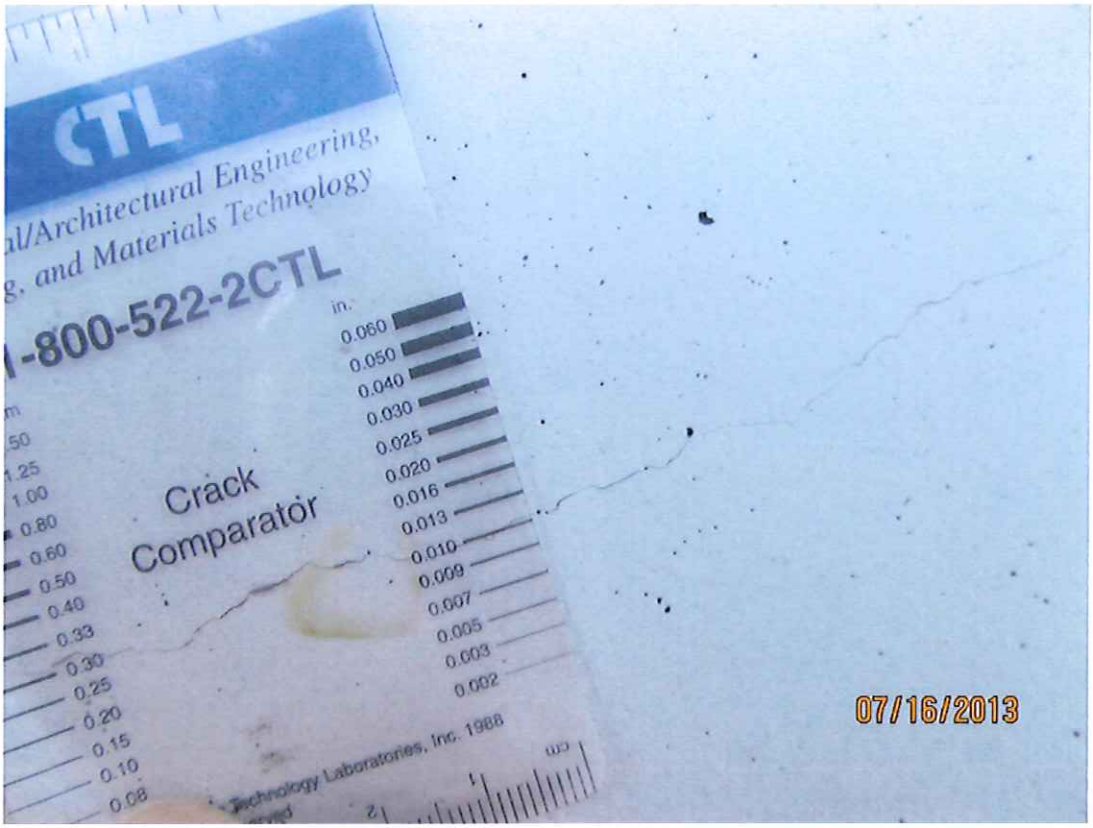


Photo 4 – Typical width of cracks in the beam webs, top and bottom flanges

PHOTOS

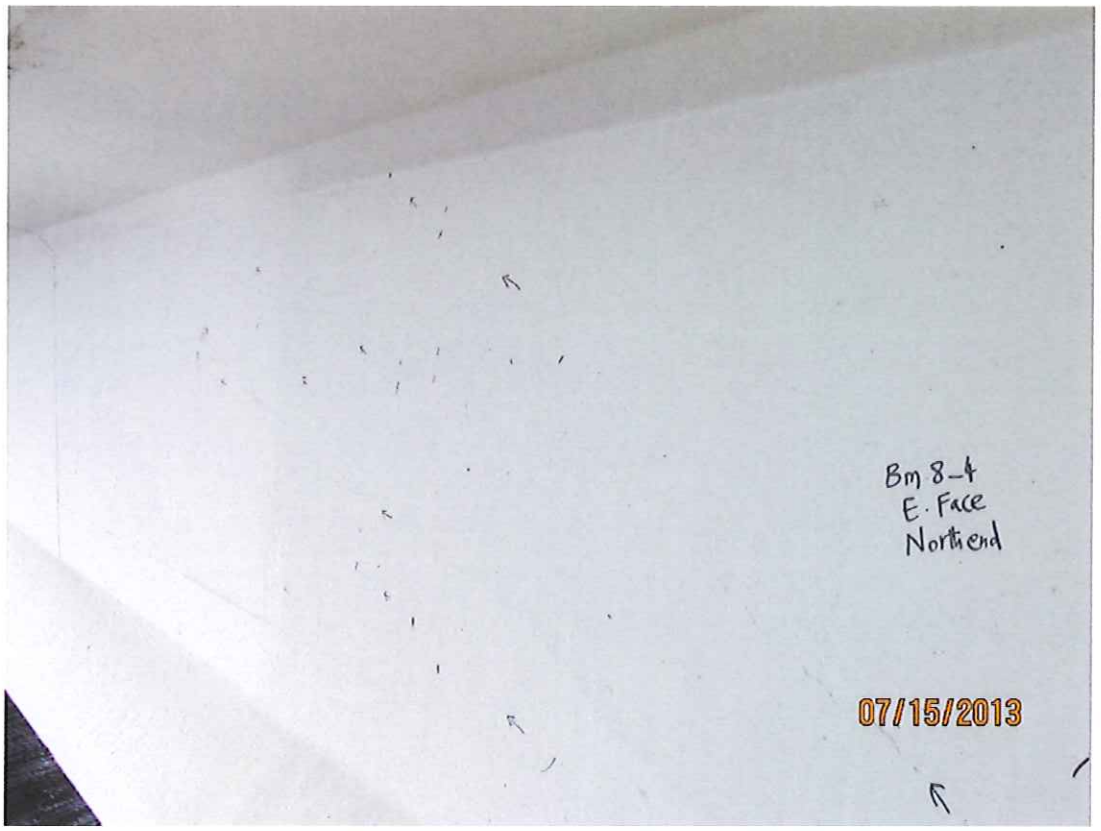


Photo 5 – Typical diagonal/shear cracks in beam webs near the beam ends

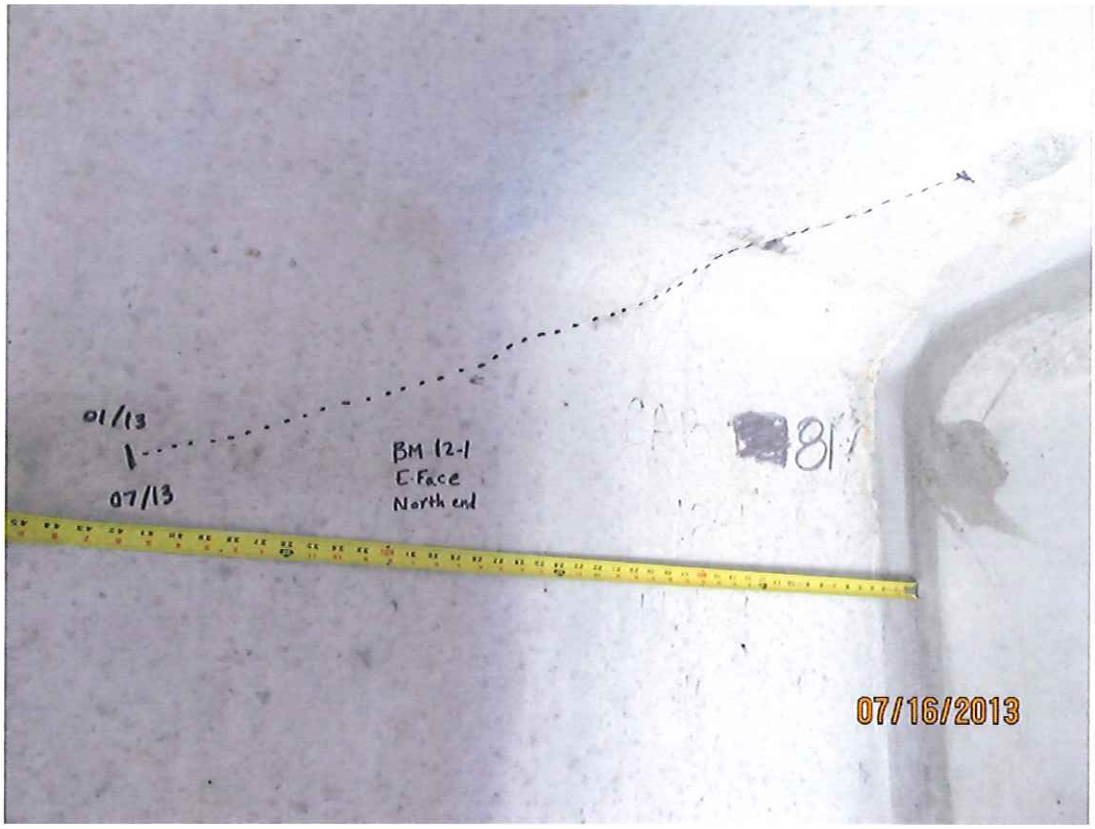


Photo 6 – Typical diagonal crack in web and top flange extending down and away from beam end

PHOTOS

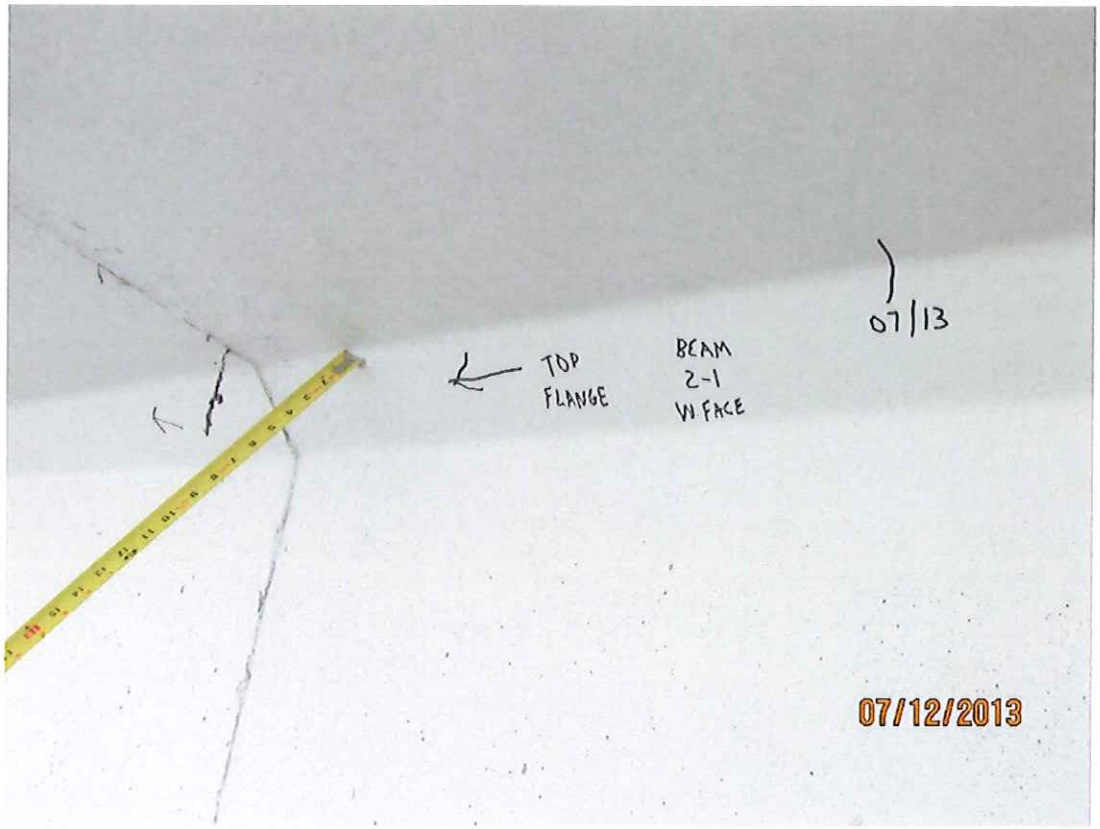


Photo 7 – Longitudinal crack in web along top flange juncture

Photo 8 – Beam 4-4 showing typical crack extending from web across bottom flange and deck

PHOTOS

Photo 9 –Multiple cracks in west face of Beam 5-1 at south end

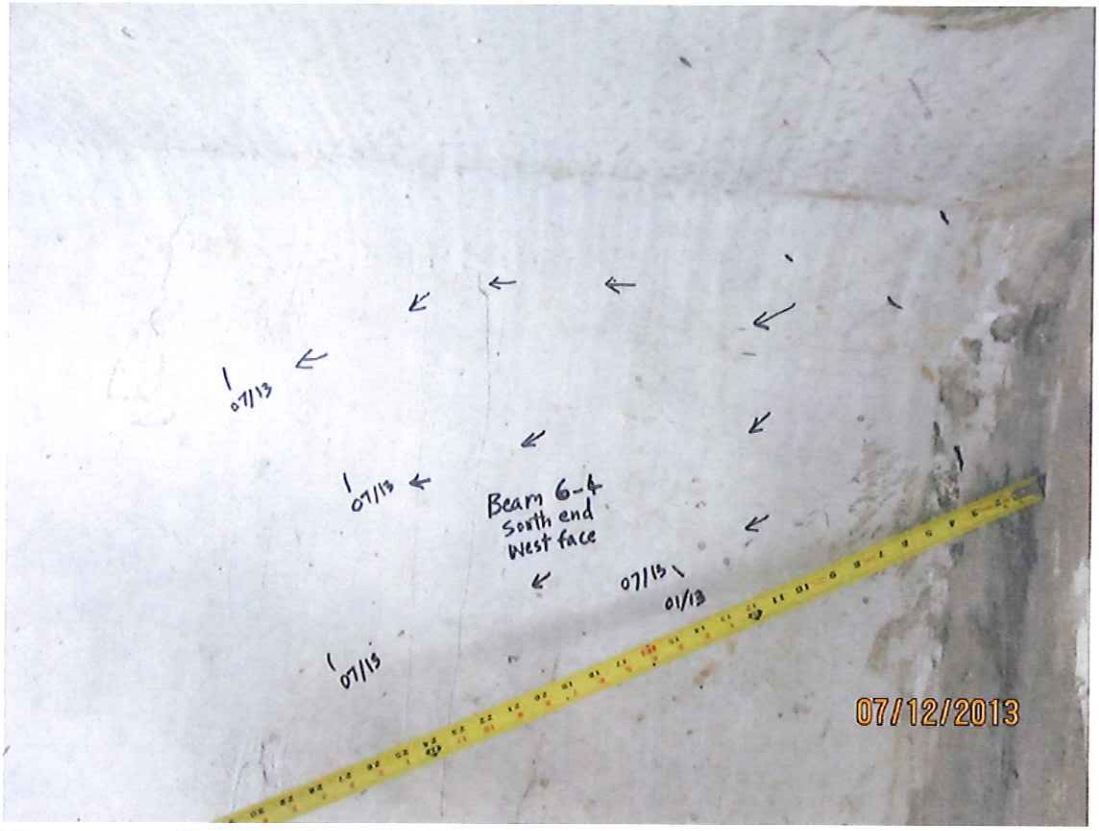


Photo 10 –Cracks in west face of web at south end extending down and away from beam end

PHOTOS

Photo 11–Delamination on west face of bottom flange at north end of Beam 6-4

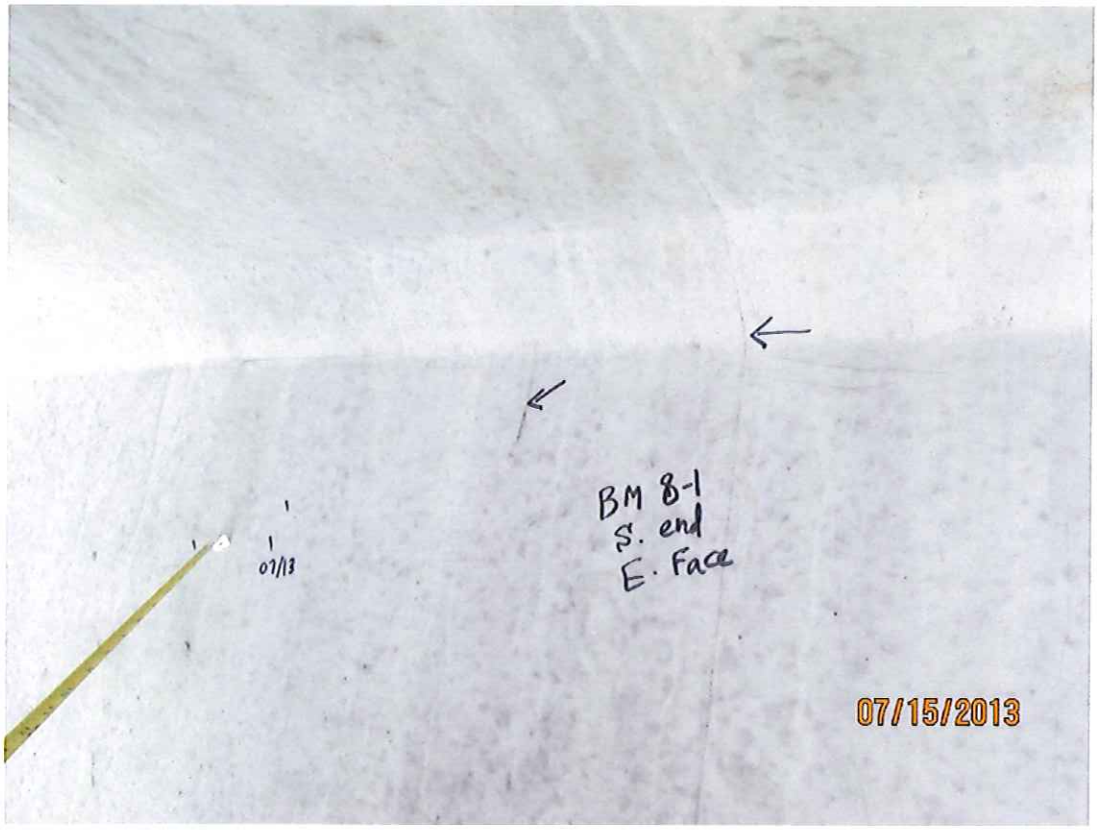


Photo 12– Diagonal crack/ longitudinal crack in Beam 8-1 east face 62in. from south end

PHOTOS

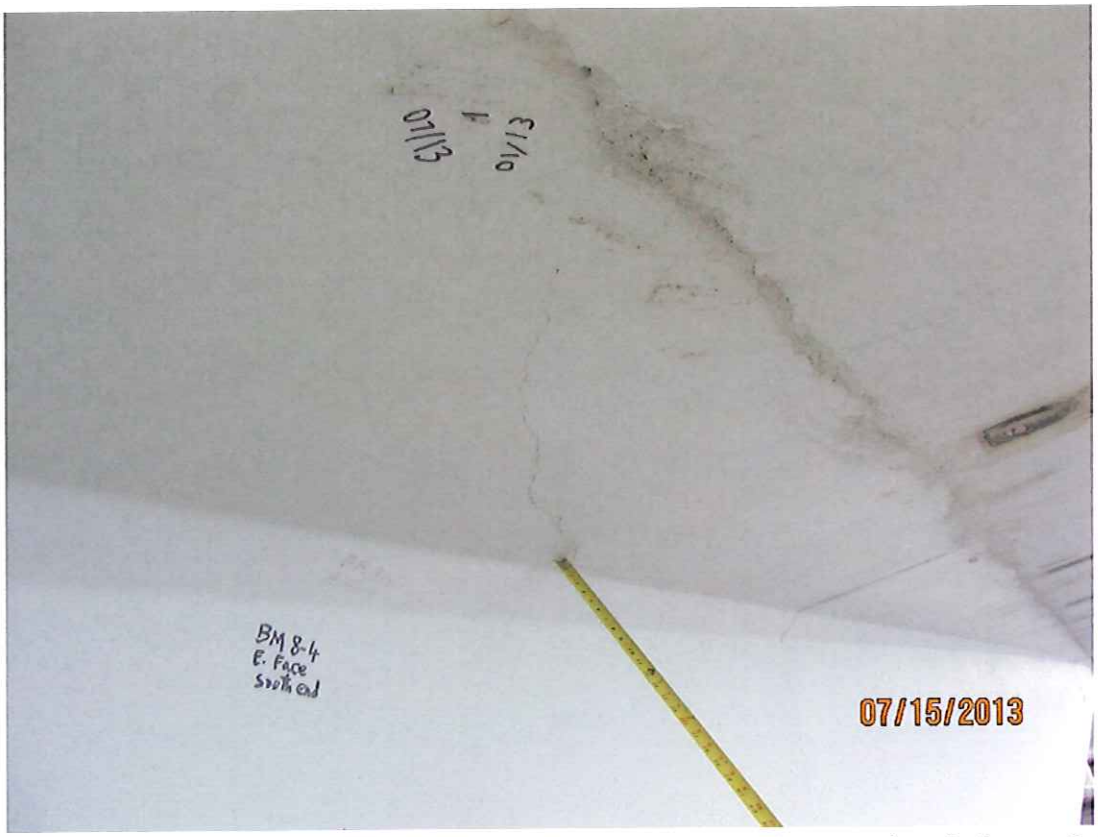


Photo 13– Longitudinal crack at web to top flange juncture 10ft. from south end of Beam 8-4

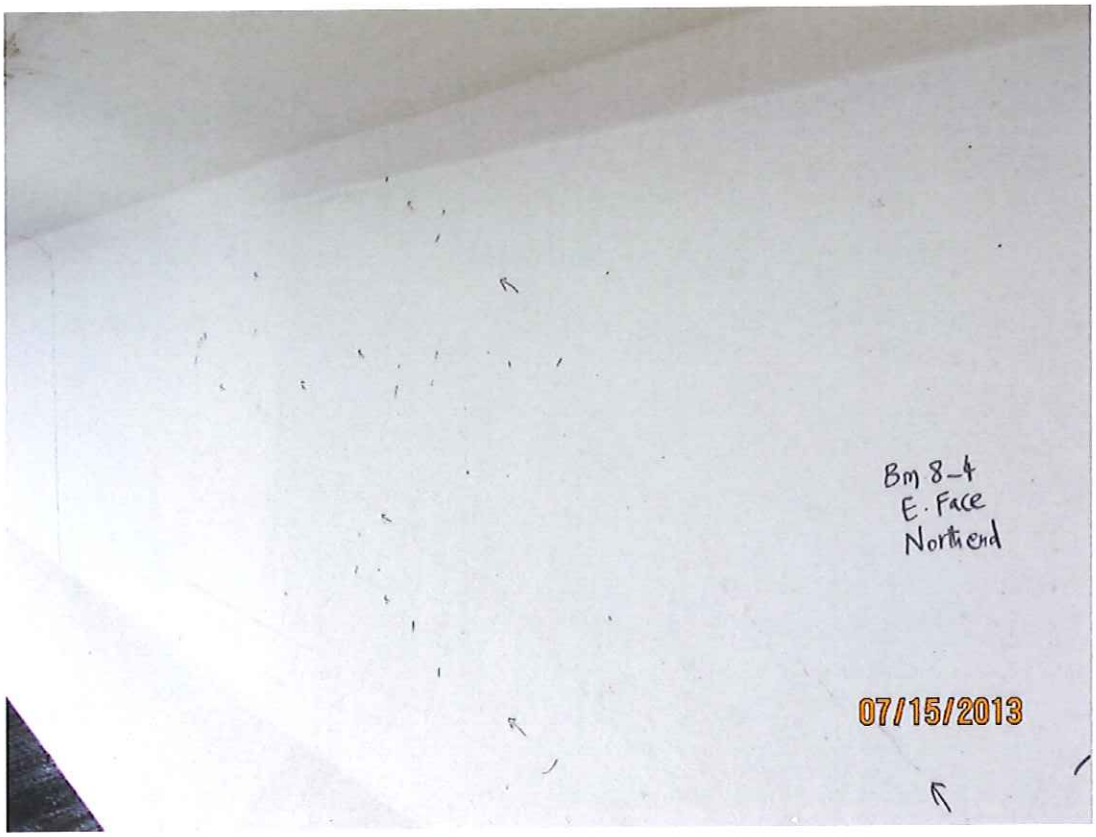


Photo 14– Cracks in east face at north end of Beam 8-4

PHOTOS

Photo 15– Diagonal cracks in east face of Beam 11-4 at south end

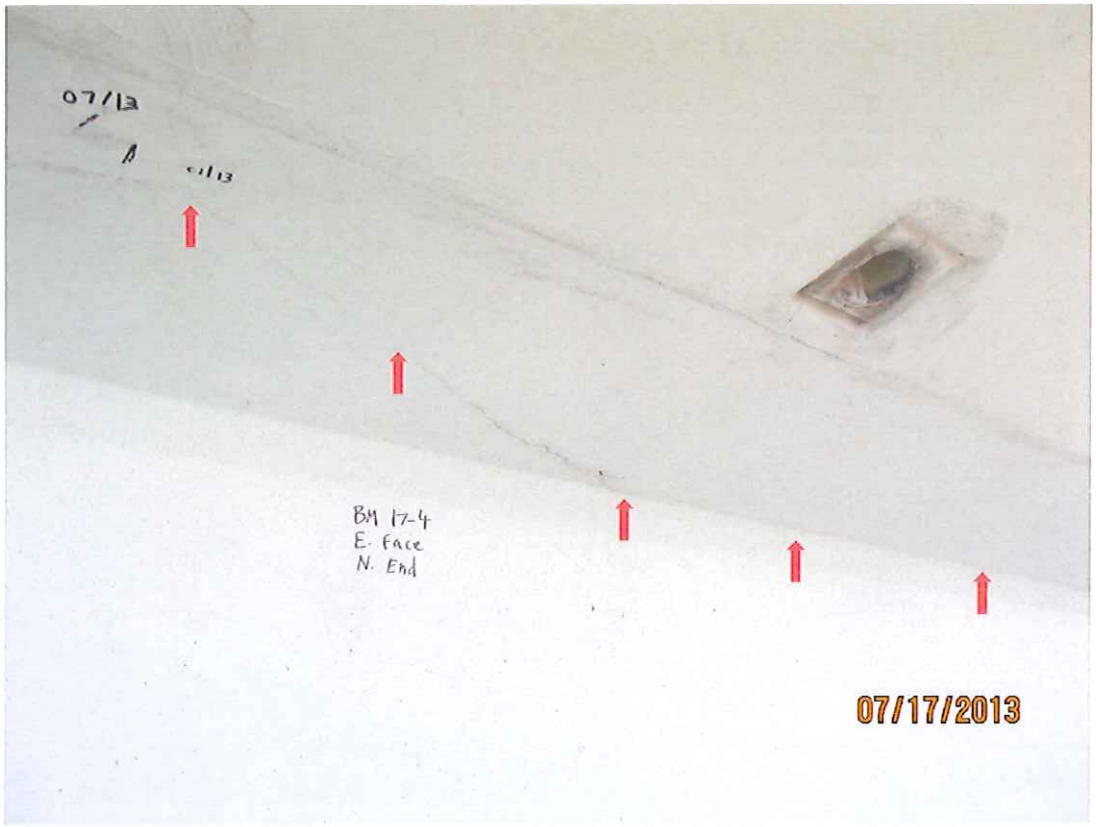


Photo 16– Longitudinal and diagonal crack in east face of Beam 17-4 along top flange

PHOTOS

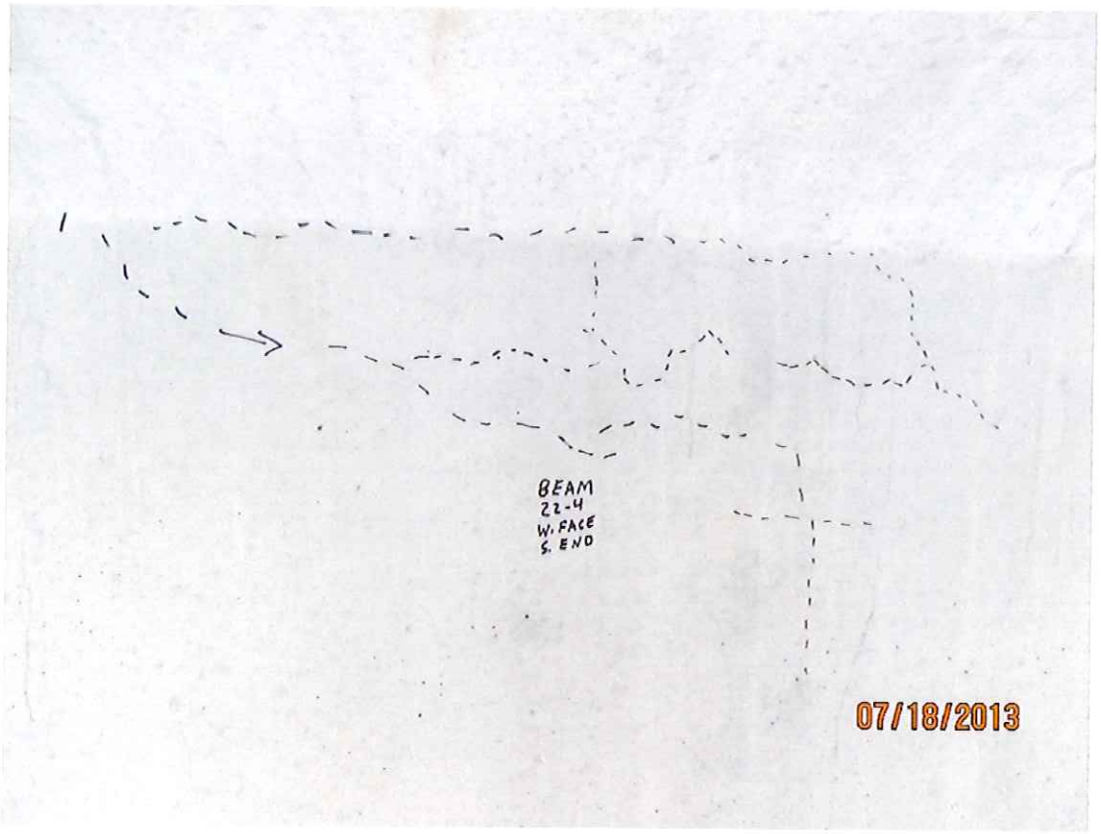


Photo 17– Cracks in east face of Beam 22-4 web at south end

RECOMMENDED MAINTENANCE REPAIR AND REHABILITATION

Based on the findings of the bridge inspection from 07/12/2013 to 07/18/2013, the following actions are recommended:

(1) Continue to monitor cracks in the beams for any increase in severity by performing follow up inspections.
(2) If cracks increase in width then suggest applying a clear protective coating over all cracks in the beam webs and top and bottom flanges typically extending from beam ends.
(3) Apply clear protective coating over diagonal/shear cracks on the following beams:
(4) Beam 4-1 – South End – West Face – 6 Cracks.
(5) Beam 4-1 – North End – West Face – 8 Cracks.
(6) Beam 17-4 – South End – East Face – 6 Cracks.
(7) Beam 17-4 – North End – East Face – 6 Cracks.
(8) Beam 22-4 – South End – East Face – 7 Cracks.
(9) Beam 22-4 – North End – East Face – 7 Cracks.
(10) Repair 45ft. longitudinal crack along west face of Beam 2-1 at top flange to deck juncture beginning 68ft. from south end.
(11) Repair 46.5ft. longitudinal crack along east face of Beam 4-4 at top flange to deck juncture beginning 10ft. from south end.
(12) Repair 30in. x 12in. delamination in west face of Beam 6-4 bottom flange at the north end.
(13) Repair diagonal/ longitudinal crack in east face of Beam 17-4 beginning 18ft. from north end at top flange juncture.