

MICHIGAN DEPARTMENT OF TRANSPORTATION
M•DOT

EVALUATION OF THE DELAMINATION
OF THE POLYURETHANE TOPCOAT

D. C. Long

Research Laboratory Section
Materials and Technology Division
Research Project 92 TI-1630
Research Report R-1328

Michigan Transportation Commission
Barton W. LaBelle, Chairman;
Richard T. White, Vice-Chairman;
Robert M. Andrews, Jack L. Gingrass
Irving J. Rubin, John C. Kennedy
Patrick M. Nowak, Director
Lansing, February 1994

Action Plan

1. Engineering Operations Committee
 - A. Approve this report.
2. R. A. Welke, Deputy Director, Bureau of Highways
 - A. Transmit report to FHWA.
3. Materials and Technology Division
 - A. Project complete; investigate any future top coat delamination problems.
 - B. Send copies of this report to all painting contractors, including those who coated the affected structures.
 - C. Prepare a MATES article on moisture related problems.
4. Construction Division
 - A. Oversee repair by contractors of structures under warranty contract.
5. Maintenance Division
 - A. Repair structures not under a warranty contract.

Executive Summary

The following report discusses top-coat delamination affecting 10 bridges coated in 1991, four of which are under a warranty specification. The investigation did not find a satisfactory explanation why nine structures completed in September and October of 1991 developed the same failure. Inspectors did not observe any dirt or other foreign material between the intermediate and top coats, so moisture on the steel is the likely cause of delamination. Late in the season, conditions are conducive to moisture formation, but there is no indication that 1991 was different from previous years. A possible explanation is that the urethane formulation that year was unusually sensitive to ambient moisture and the contractors, anxious to complete projects, did not consider top-coat application critical to performance. The inspection team found that peeling on each structure was confined to one or two spans over traffic lanes. Contractors usually paint one span in a day, which supports the hypothesis that weather conditions on a given day contributed to delamination.

The general repair procedure is to power tool clean the affected areas without damaging the underlying coats, then recoat with one mil of polyurethane. This procedure was used in 1992 to satisfactorily repair three bridges. The original contractor will repair the four bridges in this study under a warranty contract at the end of the two-year warranty period. Maintenance forces will repair the remaining structures at our expense.

The opinion of the investigators is that delamination is not widespread, and resulted from a unique set of conditions that existed in 1991. Other than encouraging the field inspectors to take dew-point readings close to the areas being coated, the investigators recommend no specification changes. The most cost-effective solution is to hold the contractor accountable for performance by expanding the warranty program.

Introduction

In early 1992, Michigan Department of Transportation (MDOT) field personnel discovered delaminated top coats on three bridges: I-69 under Vernon Road, I-69 under Grand River, and Schaefer Road over I-96. In March of 1992, the Maintenance Division requested Materials and Technology determine the cause of the delaminations and recommend repair methods for these three structures. During bridge paint warranty inspections in May 1992, the inspection team discovered several more bridges with the same problem. These structures, along with two others, were added to this study, bringing the total number of bridges to 10 (Table 1). One of the original structures in this study, I-69 under Grand River, was inspected, but it has a different type of delamination, which will not be discussed in detail. It is also not included in the tables.

Contractor	Warranty	Structure No.	Description	Completed
WWA	No	B01 of 20015	I-75 SB Over Au Sable River	Oct 1991
WWA	Yes	R01 of 20014	I-75 SB Over D&M RR	Oct 1991
WWA	Yes	S01 of 20015	N. Down River Rd. Over I-75	Oct 1991
WWA	No	S11 of 41029	M-45 Over I-196 WB	Oct 1991
WWA	No	S12 of 41029	I-196 EB Over M-45	Oct 1991
WWA	No	R03 of 41131	Franklin St Over US-131 & Ramps	Oct 1991
Ch-Weber	Yes	S04 of 73171	Busch Rd Over I-75	Sept 1991
Ch-Weber	Yes	S06 of 73171	Curtis Rd Over I-75	Sept 1991
Ch-Weber	No	S06 of 76023	I-69 Under Vernon Rd	Jul 1991
Progress	No	S14 of 82123	Schaefer Rd Over I-96	Oct 1991

This list of structures with top coat delamination may not be complete; however, no new delamination problems have been discovered since July 1993. These 10 bridges comprise about two percent of the structures painted after converting to a three-coat system in 1985.

Discussion

With one exception, all structures in the study were painted in September and October 1991. Vernon Road, the exception, was painted in July 1991.

W.W.A., Inc. coated six of the 10 structures, while Champaign-Webber and Progress Painting coated the rest, and all used Carboline's system (658, 190HB and 134). The investigation did not find a satisfactory explanation why nine structures completed in a two-month period all developed the same failure. Weather conditions, coating materials, and contractor practices could all be causes, but were not unique to the subjects of this study. Busch Road and Curtis Road, for example, were painted at the same time as Townline Road, yet Townline did not exhibit any peeling or delamination problem. Late in the season, conditions are conducive to moisture formation, but there is no indication that 1991 was different from previous years. Also, Carboline is a proven system used successfully for several years. All three contractors had the same problem, which seems to rule out faulty procedures. A possible explanation is that for some reason the urethane formulation that year was unusually sensitive to ambient moisture and the contractors, anxious to complete projects, did not consider top-coat application critical to performance.

Inspection Procedures

Representatives from Materials and Technology, Maintenance and Construction Divisions inspected each bridge from the Reach-All vehicle. The Reach-All enabled the inspection team to observe the structural steel, take close-up photographs of the affected areas (Appendix A), and scrape off samples of the delaminated coating for further analysis. A detailed inspection report was completed for each structure (Appendix B).

The inspection team found that peeling on each structure appeared only on one or two spans over traffic lanes. Each beam within the affected span showed delamination, with the top of the bottom flange frequently being the starting point for peeling. Contractors usually paint one span in a day, which supports the hypothesis that weather conditions on a given day contributed to delamination. Brush and Vernon Roads will need extensive or complete repair of entire spans or sections, the rest will require zone or spot repairs.

Findings

A microscopic examination of samples collected from the field verified the observation that the top coat separated cleanly from the intermediate coat. Painting over foreign material, such as dirt, oil, or moisture will cause intercoat delamination. Inspectors did not observe any dirt or other foreign material between the intermediate and top coats, so moisture on the previously painted intermediate coat is the likely cause of delamination. Examining a coating after it is cured, however, will not reveal whether the contractor painted over a thin layer of moisture.

Investigators obtained copies of the field inspector's Interim Daily Report (IDR) to check if conditions were favorable for moisture formation at the time of painting. They found that temperature and humidity readings are frequently missing from the IDRs (Table 2), but in cases where temperatures were recorded, the contractor applied the top coat within specification limits for air and steel temperature, humidity, and recoat time. Our specification requires that the steel temperature be at least five degrees above the dew point before painting can begin. With Michigan's climate, the steel or surface temperature is frequently only seven degrees above the dew point during much of the painting season, creating the potential for localized areas to be at or near the dew point and collect moisture. Field inspectors usually take one or two dew-point readings, so it is possible that isolated areas did not meet specification requirements. For this reason, MDOT specifications require the contractor to be responsible for this type of quality control to avoid painting over moisture.

Bridge	Section	Peeling	Date	Steel	Dew	Diff.	Air
Townline Rd.	tailspan,abut A	N	9-5	N/A	52	N/A	56
Townline Rd.	tailspan,abut B	N	9-5	N/A	63	N/A	78
Busch Rd.	tailspan,abut A	N	9-5	80	65	15	80
Busch Rd.	median	N	9-10	78	71	7	78
Busch Rd.	NB lanes	N	10-1	N/A	N/A	N/A	N/A
Busch Rd.	SB lanes	Y	10-1	N/A	N/A	N/A	N/A
Curtis Rd.	tailspan	N	5-31	79	73	6	80
Curtis Rd.	tailspan,abut A	N	7-30	70	63	7	71
Curtis Rd.	median/lt.sh'ldr	N	7-31	N/A	72	N/A	82
Curtis Rd.	SB rt. 2 lanes	Y	9-12	57	51	6	58
Curtis Rd.	NB rt. 2 lanes	N	9-19	59	47	12	58
Vernon Rd.	Span 4	N	7-3	N/A	N/A	N/A	N/A
Vernon Rd.	Span 1	N	7-30	N/A	59	N/A	N/A
Vernon Rd.	15' of Span 3	Y	7-30	N/A	59	N/A	N/A
Vernon Rd.	Span 2	N	7-31	N/A	59	N/A	N/A
Vernon Rd.	Span 3	Y	7-31	N/A	59	N/A	N/A
I-75 SB/D&M RR	N. tailspan	N	10-3	N/A	N/A	N/A	N/A

TABLE 2							
Bridge	Section	Peeling	Date	Steel	Dew	Diff.	Air
I-75 SB/D&M RR	Span 1	Y	10-3	N/A	N/A	N/A	N/A
I-75 SB/D&M RR	Span 2	N	10-3	N/A	N/A	N/A	N/A

The only bridge that did not have top-coat peeling was I-69 under Grand River where the intermediate and top coats peeled away from the primer. This resulted from applying the intermediate coat over an under-cured primer, trapping solvent which caused the coats to separate later. Maintenance forces repaired this structure in 1992.

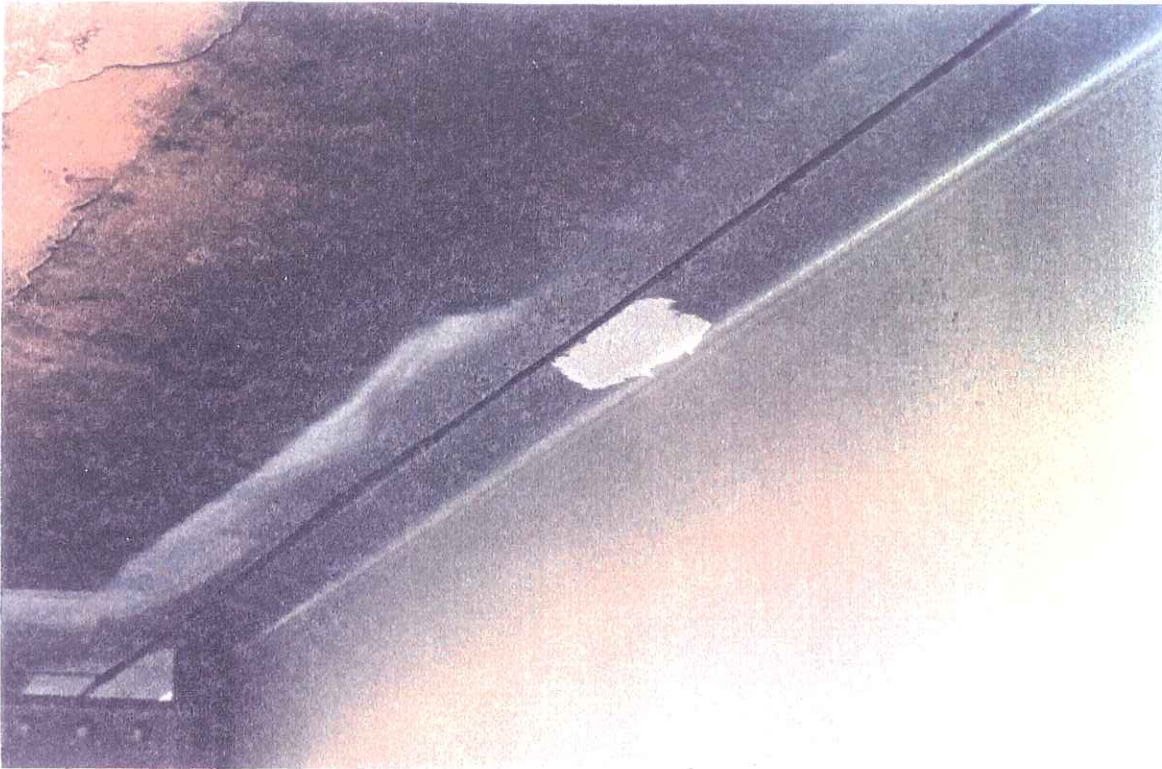
Repair Procedures

The general repair procedure is to power clean the affected areas without damaging the underlying coats, then recoat with 1 mil of polyurethane. This procedure was used to satisfactorily repair eastbound I-196, Franklin Street and Schaefer Road in 1992. The original contractor will repair bridges in this study that are under a warranty contract at the end of the two-year warranty period. Maintenance forces will repair the remaining bridges at MDOT's expense.

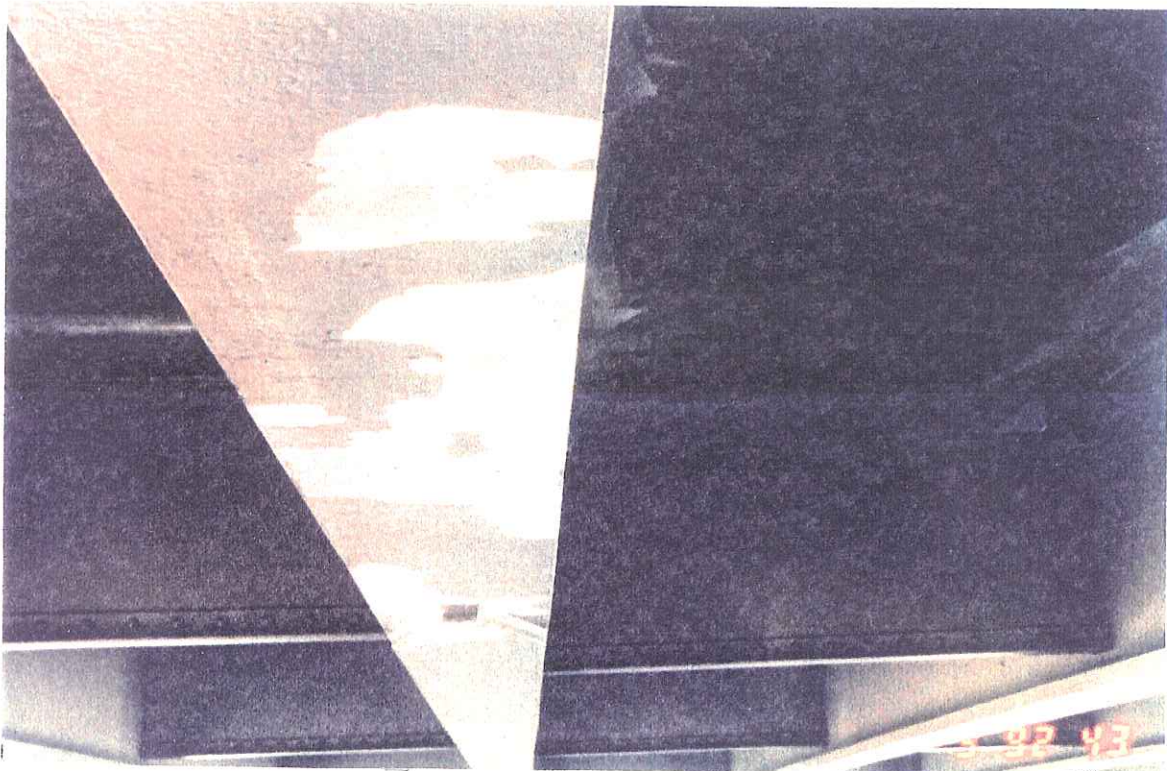
Conclusions and Recommendations

The opinion of the investigators is that such delamination is not widespread and resulted from an unique set of conditions that existed in 1991. To reduce moisture-related delamination of this type would require specification changes including raising the dew-point and steel-temperature differential, requiring total enclosures for painting, and verifying environmental conditions throughout the structure. Other than encouraging the field inspectors to take dew-point readings close to the areas being painted, the investigators recommend making no specification changes. Taking additional dew-point measurements late in the season may help, but it is not practical to take sufficient measurements to ensure moisture-free conditions throughout the structure. Revising the steel-temperature and dew-point specification is also impractical, because it would severely limit the number of days contractors could paint. With only two percent of the bridges painted since 1985 exhibiting delamination, the cost of requiring total enclosure is not justified at this time. If delamination continues to be a problem, the department should re-evaluate the cost of specification changes. The most cost-effective solution is to hold the contractor accountable for performance by expanding the warranty program.

APPENDIX A



Peeling top coat on bottom of top flange



Peeling top coat on bottom of bottom flange



Peeling topcoat on bottom of bottom flange

APPENDIX B

FIELD INSPECTION REPORT

PROJECT #: 20015 29593	STRUCTURE #: B01	DATE INSPECTED: 06/14/93
LOCATION: I-75 SB Over AuSable R	INSPECTORS: Phifer, Whelton & Kangas	
PROJECT ENGINEER OR REPRESENTATIVE:		
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134		
PURPOSE: <u>Look at peeling paint.</u>		
FAILURE TYPES:	NO	YES
FADING	<u>X</u>	
PEELING		<u>X</u>
BLISTERING	<u>X</u>	
RUNS AND SAGS		<u>X</u>
PINPOINT RUST		<u>X</u>
DAMAGED COATING	<u>X</u>	
PAINT OVER DEBRIS		<u>X</u>
DEFICIENT PRIMER		<u>N/A</u>
DEFICIENT TOPCOAT		<u>X</u>
		LOCATION
		<u>Random on top of bottom flanges.</u>
		<u>Random.</u>
		<u>Random.</u>
		<u>One location under diaphragm.</u>
		<u>Random.</u>
EVALUATION: _____		
FOLLOW UP NEEDED: _____		
FINAL COMMENTS: _____		
SIGNATURE: <u>Bryon D. Beck</u> DATE: 06 / 17 / 93		

cc: J. W. Reincke (92 TI-1630)
 R. E. Nordlund
 E. M. Phifer

JWR

FIELD INSPECTION REPORT

PROJECT #: 20014 29593	STRUCTURE #: R01	DATE INSPECTED: 06/14/93																																								
LOCATION: I-75 SB Over D&M RR	INSPECTORS: B. Beck & K. Whelton																																									
PROJECT ENGINEER OR REPRESENTATIVE:																																										
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134																																										
PURPOSE: <u>Look at peeling topcoat.</u>																																										
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:30%;">FAILURE TYPES:</th> <th style="width:10%;">NO</th> <th style="width:10%;">YES</th> <th style="width:50%;">LOCATION</th> </tr> </thead> <tbody> <tr> <td>FADING</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> <tr> <td>PEELING</td> <td align="center">_____</td> <td align="center">X</td> <td><u>Very thick piece of urethane bends</u></td> </tr> <tr> <td>BLISTERING</td> <td align="center">_____</td> <td align="center">_____</td> <td><u>& then is brittle on the edges.</u></td> </tr> <tr> <td>RUNS AND SAGS</td> <td align="center">_____</td> <td align="center">X</td> <td><u>Numerous - problem.</u></td> </tr> <tr> <td>PINPOINT RUST</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> <tr> <td>DAMAGED COATING</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> <tr> <td>PAINT OVER DEBRIS</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> <tr> <td>DEFICIENT PRIMER</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> <tr> <td>DEFICIENT TOPCOAT</td> <td align="center">_____</td> <td align="center">_____</td> <td>_____</td> </tr> </tbody> </table>			FAILURE TYPES:	NO	YES	LOCATION	FADING	_____	_____	_____	PEELING	_____	X	<u>Very thick piece of urethane bends</u>	BLISTERING	_____	_____	<u>& then is brittle on the edges.</u>	RUNS AND SAGS	_____	X	<u>Numerous - problem.</u>	PINPOINT RUST	_____	_____	_____	DAMAGED COATING	_____	_____	_____	PAINT OVER DEBRIS	_____	_____	_____	DEFICIENT PRIMER	_____	_____	_____	DEFICIENT TOPCOAT	_____	_____	_____
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DEFICIENT PRIMER	_____	_____	_____																																							
DEFICIENT TOPCOAT	_____	_____	_____																																							
EVALUATION: <u>Beam B Pier 1 peeling on top bott flange, peeling - Beam D</u> <u>east top of bott flange, also Beam E, Beam G 2nd span - dry spray?</u>																																										
FOLLOW UP NEEDED: _____																																										
FINAL COMMENTS: _____																																										
SIGNATURE: <u>Bryon D. Beck</u> DATE: 06 / 17 / 93																																										

cc: J. W. Reincke (92 TI-1630)
R. E. Nordlund
E. M. Phifer

FIELD INSPECTION REPORT

PROJECT #: 20015 29593	STRUCTURE #: S01	DATE INSPECTED: 06/14/93
LOCATION: N Down River Rd Over I-75	INSPECTORS: Phifer, Whelton & Kangas	
PROJECT ENGINEER OR REPRESENTATIVE:		
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134		
PURPOSE: <u>Look at peeling paint with manufacturer's representative.</u>		
FAILURE TYPES:	NO	YES
		LOCATION
FADING	<u>X</u>	
PEELING	<u> </u>	<u>X</u>
BLISTERING	<u> </u>	<u> </u>
RUNS AND SAGS	<u> </u>	<u>X</u>
PINPOINT RUST	<u> </u>	<u>X</u>
		<u>Several areas (see photos).</u>
		<u>Random.</u>
		<u>Along welded cover plate & threads</u>
		<u>on bolted connections.</u>
DAMAGED COATING	<u>X</u>	<u> </u>
PAIN T OVER DEBRIS	<u>X</u>	<u> </u>
DEFICIENT PRIMER	<u> </u>	<u> </u>
DEFICIENT TOPCOAT	<u>X</u>	<u> </u>
		<u>None observed in area (W&N Beams).</u>
		<u>None observed in area (W&N Beams).</u>
		<u>N/A</u>
		<u>Thickness okay.</u>
EVALUATION: _____		

FOLLOW UP NEEDED: _____		

FINAL COMMENTS: _____		

SIGNATURE: <u>Bryon D. Beal</u> DATE: 06 / 17 / 93		

cc: J. W. Reincke (92 TI-1630)
R. E. Nordlund
E. M. Phifer

FIELD INSPECTION REPORT

PROJECT #: 41029 30982	STRUCTURE #: S11	DATE INSPECTED: 06/15/93	
LOCATION: M-45 Over I-196 WB	INSPECTORS: B. Beck		
PROJECT ENGINEER OR REPRESENTATIVE:			
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134			
PURPOSE: <u>Look at peeling topcoat.</u>			
FAILURE TYPES:	NO	YES	LOCATION
FADING	<u>X</u>	_____	_____
PEELING	<u>X</u>	_____	_____
BLISTERING	<u>X</u>	_____	_____
RUNS AND SAGS	_____	<u>X</u>	<u>At Pier 2 and diaphragms.</u>
PINPOINT RUST	_____	<u>X</u>	<u>Some small areas at Pier 2.</u>
DAMAGED COATING	_____	<u>X</u>	<u>Scaffold support marks.</u>
PAINT OVER DEBRIS	<u>X</u>	_____	_____
DEFICIENT PRIMER	<u>X</u>	_____	_____
DEFICIENT TOPCOAT	_____	<u>X</u>	<u>Some small areas.</u>
EVALUATION: <u>Average coatings job, areas contaminated by steel shot left on surfaces after paint cured. At Pier 1 paint over rust at Bolster poor paint coverage at Pier 1 bottom bottom flange.</u>			
FOLLOW UP NEEDED: _____			

FINAL COMMENTS: _____			

SIGNATURE: <u>Bryon D. Beck</u>		DATE: 06 / 17 / 93	

cc: J. W. Reincke (92 TI-1630)
R. E. Nordlund
E. M. Phifer

FIELD INSPECTION REPORT

PROJECT #: 41029 30982	STRUCTURE #: S12	DATE INSPECTED: 06/15/93																																								
LOCATION: I-196 EB Over M-45	INSPECTORS: Mark, Eileen & Rick																																									
PROJECT ENGINEER OR REPRESENTATIVE:																																										
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134																																										
PURPOSE: Peeling paint.																																										
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DEFICIENT TOPCOAT	<u> </u>	<u>X</u>	<u>Random.</u>																																							
EVALUATION: Painted in September 1991.																																										
FOLLOW UP NEEDED:																																										
FINAL COMMENTS:																																										
SIGNATURE: <u>Bryan D. Beck</u>		DATE: 06 / 17 / 93																																								

cc: J. W. Reincke (92 TI-1630)
R. E. Nordlund
E. M. Phifer

FIELD INSPECTION REPORT

INSPECTION

DATE: July 24, 1992

INSPECTOR: B. Beck

PROJECT #: 28076

STRUCTURE #: S14

LOCATION: Schaefer Road Over I-96

ACTIVE:

PROJECT ENGINEER: C. Dargin

PURPOSE: Investigate peeling coatings.

DISCUSSION:

RESULTS: Area of peeling coating has been repaired.

FOLLOW UP NEEDED:

FINAL COMMENTS:

NAME: Bryon Beck

DATE: July 24, 1992

cc: J. W. Reincke (92 TI-1630)
E. M. Phifer

FIELD INSPECTION REPORT

PROJECT #: 73171/29616	STRUCTURE #: S06	DATE INSPECTED: 10/14/93
LOCATION: E. Curtis Rd. Over I-75	INSPECTORS: Whelton & Phifer	
PROJECT ENGINEER OR REPRESENTATIVE: Ertel		
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134		
PURPOSE: Final warranty inspection.		
FAILURE TYPES:	NO	YES
	LOCATION	
FADING	<u> X </u>	
PEELING	<u> </u>	<u> X </u>
BLISTERING	<u> </u>	
RUNS AND SAGS	<u> </u>	<u> X </u>
PINPOINT RUST	<u> </u>	<u> X </u>
DAMAGED COATING	<u> </u>	<u> X </u>
PAINT OVER DEBRIS	<u> </u>	<u> X </u>
DEFICIENT PRIMER	<u> </u>	<u> X </u>
DEFICIENT TOPCOAT	<u> </u>	<u> X </u>
		<u> See notes. </u>
		<u> Around rivets. </u>
		<u> See notes. </u>
		<u> See notes. </u>
		<u> See notes. </u>
		<u> Some areas the white shows thru in pinpoints. </u>
EVALUATION: <u>On diaphragm & plate edges there is insufficient coating or none at all; chrome plated pins were not topcoated and have some rusting. Painted over rust on anchor bolts, bolts on diaphragms, riveted connector plates. Some slivers & mech damage show some rust (Continued Below)</u>		
FOLLOW UP NEEDED: <u>None.</u>		
FINAL COMMENTS: <u>Interim report will include this bridge.</u>		
SIGNATURE: <u><i>E. Phifer</i></u>		DATE: 11 / 2 / 93

cc: J. W. Reíncke (90 TI-1515)
 R. E. Nordlund
 E. M. Phifer *JWR*

on facia over right shoulder on NB and left diaphragm lane on south facia and subsequent beams. NB some flaking (peeling) on edge of bottom flange in from mech. or physical damage. Cover plate weld has pinpoint rust.

Pinhole rusting on weldment of cover plate. Some areas of the bottom of diaphragms over top of bottom flange of beams have pinhole rusting. Thick paint pop off on beam B top bottom flange at diaphragm over NB lane. Pinhole rust on bottom bottom flange over pier 1 & 2, worse on pier 1. Also, bottom sole plate and top bearing plate rusting. Rust staining from anchor bolt holes.

NB median shoulder area diaphragm ends and anchor bolts over pier 2 need repair. Intermediate diaphragm rivets, bottom row, have missed areas on bottom edge. Rust spots along bottom flange cover plate welds, on most beams. Top of bottom flange on beam D over fast lane has paint over dirt. Other flanges look similar, only over fast lane. Intermediate diaphragm over fast lane between beams B & C has some rust showing. South fascia beam over fast lane has a very rough finish - dirt in topcoat?

FIELD INSPECTION REPORT

PROJECT #: 73171 29616	STRUCTURE #: S04	DATE INSPECTED: 06/14/93																																								
LOCATION: Busch Rd. Over I-75	INSPECTORS: K. Whelton																																									
PROJECT ENGINEER OR REPRESENTATIVE:																																										
SUPPLIER OF COATING SYSTEM: Carboline 658-190HB-134																																										
PURPOSE: <u>Look at peeling topcoat.</u>																																										
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:35%;">FAILURE TYPES:</th> <th style="width:10%;">NO</th> <th style="width:10%;">YES</th> <th style="width:45%;">LOCATION</th> </tr> </thead> <tbody> <tr> <td>FADING</td> <td align="center">_____</td> <td align="center">_____</td> <td></td> </tr> <tr> <td>PEELING Pic. #11</td> <td align="center">_____</td> <td align="center">X</td> <td><u>N. Fascia/SB Slow Lane-Top Flange?</u></td> </tr> <tr> <td>BLISTERING</td> <td align="center">_____</td> <td align="center">_____</td> <td><u>Also, bot. of bot. flange - 15.</u></td> </tr> <tr> <td>RUNS AND SAGS Pic. #12</td> <td align="center">_____</td> <td align="center">_____</td> <td><u>Peeling Beam E - Top, Web, Bottom.</u></td> </tr> <tr> <td>PINPOINT RUST Pic. #13</td> <td align="center">_____</td> <td align="center">_____</td> <td><u>Peeling inside Beam F.</u></td> </tr> <tr> <td>DAMAGED COATING</td> <td align="center">_____</td> <td align="center">_____</td> <td></td> </tr> <tr> <td>PAINT OVER DEBRIS</td> <td align="center">_____</td> <td align="center">_____</td> <td></td> </tr> <tr> <td>DEFICIENT PRIMER</td> <td align="center">_____</td> <td align="center">_____</td> <td></td> </tr> <tr> <td>DEFICIENT TOPCOAT</td> <td align="center">_____</td> <td align="center">_____</td> <td></td> </tr> </tbody> </table>			FAILURE TYPES:	NO	YES	LOCATION	FADING	_____	_____		PEELING Pic. #11	_____	X	<u>N. Fascia/SB Slow Lane-Top Flange?</u>	BLISTERING	_____	_____	<u>Also, bot. of bot. flange - 15.</u>	RUNS AND SAGS Pic. #12	_____	_____	<u>Peeling Beam E - Top, Web, Bottom.</u>	PINPOINT RUST Pic. #13	_____	_____	<u>Peeling inside Beam F.</u>	DAMAGED COATING	_____	_____		PAINT OVER DEBRIS	_____	_____		DEFICIENT PRIMER	_____	_____		DEFICIENT TOPCOAT	_____	_____	
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EVALUATION: _____																																										
FOLLOW UP NEEDED: _____																																										
FINAL COMMENTS: _____																																										
SIGNATURE: <u>Brian D. Beal</u> DATE: 06 / 17 / 93																																										

cc: J. W. Reincke (92 TI-1630)
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