

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT

*Spec File
5102107
Finish Coat- Experimental
M Cal 100*

[Signature]

June 25, 1965

To: W. W. McLaughlin
Testing and Research Engineer

From: E. A. Finney

Subject: Research Report R-524; Project 49 G-50(4) Bridges and
Bridge Railings

Attached are copies of subject report for your review and
distribution indicated.

Because of the color photographs, reproduction has been
limited.

OFFICE OF TESTING AND RESEARCH

E. A. Finney
E. A. Finney, Director
Research Laboratory Division

EAF:em

cc: H. E. Hill
J. E. Meyer
P. A. Nordgren
H. J. Rathfoot

LAST COPY
DO NOT REMOVE FROM LIBRARY

OFFICE MEMORANDUM



MICHIGAN

STATE HIGHWAY DEPARTMENT

June 23, 1965

To: W. W. McLaughlin
Testing and Research Engineer

From: E. A. Finney

Subject: Sixth Progress Report on Special Painting of Steel Bridge Girders under Project "Bridges and Bridge Railings - Construction and Maintenance." Research Project 49 G-50(4). Research Report No. R-524.

A fourth inspection was completed in a program of observing the performance of 12 selected paint systems applied in 1960 on steel deck girders of two bridges on re-located M 78 near Durand. Results of the preceding inspection were presented in Research Report No. R-460, dated May 25, 1964.

Laboratory personnel made this inspection on May 7 and 10, 1965, assisted by J. Badalucco of the Office of Maintenance, and utilizing District personnel and equipment. They report that after about 4-1/2 years of service, the coatings, with but two exceptions, are generally in fair-to-good condition and rated better than standard coatings for this length of service.

Specific comments regarding the coatings on the two bridges are summarized as follows:

Four-Span M 71 Bridge over M 78. The eight test coating systems are performing satisfactorily, except System No. 5 (based on California specification two-component epoxy undercoats) which now shows spot failure on the lower flange of the fascia beam (Fig. 1). This system showed performance equivalent to others on interior areas of bridge steel. Localized leakage through deck joints has caused initial coating area failure, especially over the north pier where it was comparatively worse under the curbs (Fig. 2). The south pier area showed similar distress, but to a lesser degree. The construction joint over the central pier showed almost no leakage, and produced no significant rusting. Minor edge rusting on beam lower flanges has appeared dormant for the last two years. It was worse on Systems 1 and 2 (the control coatings), probably in part because their span is short and the lower flange comparatively thinner than in central spans. The other short span where the galvanizing and zinc-rich based systems are under evaluation showed no noticeable edge rusting. The small stripped spots, noted last year at north end of the galvanized fascia beam, have not worsened and show no red rusting. No one system stood out as "best performing" after 4-1/2 years of service.

Three-Span M 78 Bridge over Shiawassee River. The six test coating systems are performing satisfactorily, except for Systems 4 and 5 which use a tar intermediate coat that is contributing to increasing and objectionable bleeding through the aluminum topcoat

(Fig. 3). The outside fascias of these systems showed significantly less bleeding, but did show distress from cracking and alligating. However, they showed almost no corrosion on edges of beam lower flanges, as reported from the previous inspection. Most deck joints, one sliding plate steel expansion dam, and one concrete expansion type over the central piers appear to have sealed themselves, thereby causing no recent addition to the almost negligible rusting in these areas. Joints over the abutments may be taking most of the movement. Minor edge rusting noticed on lower flanges of beams has appeared dormant for the last two years. The edge rusting was found mostly on Systems 1, 2, and 3, but not on Systems 4 and 5 as has been explained, nor on System 6 which utilizes a zinc-rich primer. No one system stands out here either as "best performing" after 4-1/2 years of service.

Summary

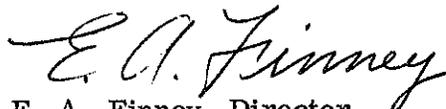
Based on current and past inspections, all but two of the preselected twelve test coating systems are giving better than average performance after 4-1/2 years of field service on structural steel of the two bridges. At least 95 percent of the coated area is in good condition and rust free. The remaining area shows varying amounts of rusting at locations most susceptible to early coating failure, such as sharp edges of beam lower flanges and in joint areas.

Deterioration of the coatings does not appear to have increased noticeably over the past two years. The reason for this stabilization is not known, but it is probably due to blast cleaning of the steel; to the four-coat, 5-mil thickness of the coating systems; and to partial self-sealing of the deck joints.

Of the two coating systems showing poor performance, one was based on two-component epoxy undercoats, while the other used a tar intermediate coat. Otherwise, no definite superiority was evident for the test coating systems. The galvanized coating is red-rust-free, although there is some surface deterioration, or white-rusting, in the joint area and on the bottom face of the lower flanges.

A future inspection will be made and reported.

OFFICE OF TESTING AND RESEARCH



E. A. Finney, Director
Research Laboratory Division

EAF:AJP:nl

cc: H. E. Hill
J. E. Meyer
P. A. Nordgren
H. J. Rathfoot

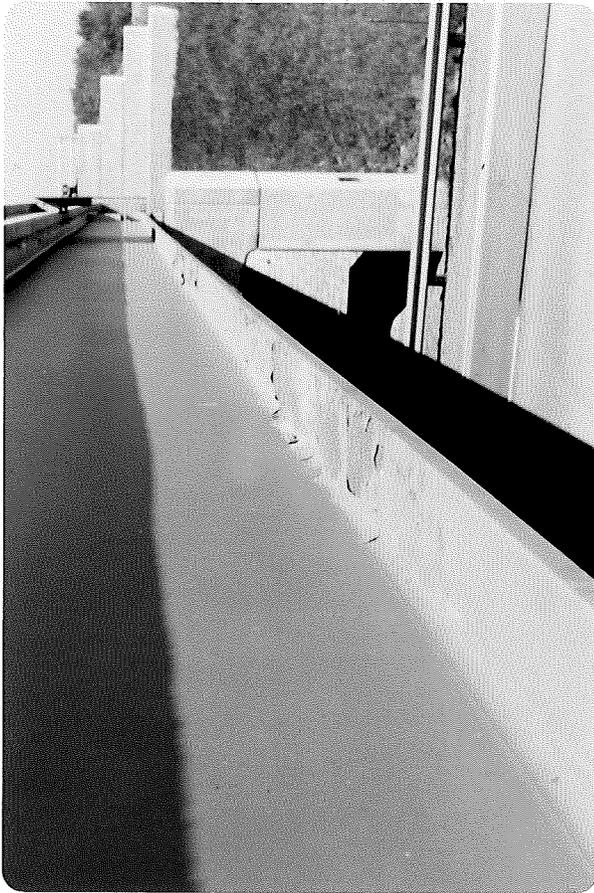


Figure 1 (above). Spot failure of System 5, based on epoxy undercoats, with red rust evident where paint has blistered and peeled (lower flange of east fascia beam--M 71 bridge).

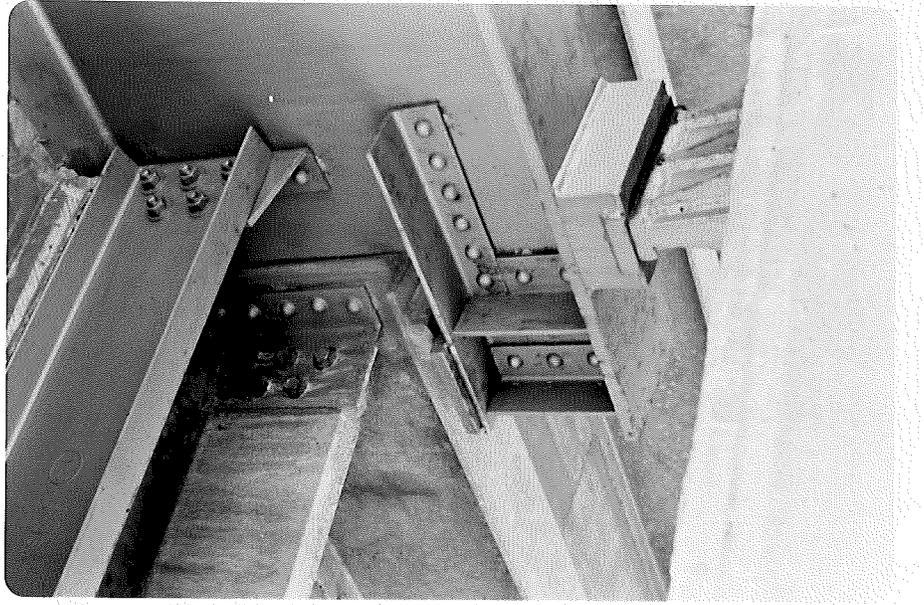


Figure 2 (right). Coating condition under joint area, with System 6 (paint) in foreground and System 8 (galvanizing) in background. Red rust is evident on paint system and white rust on galvanized system (M 71 bridge).

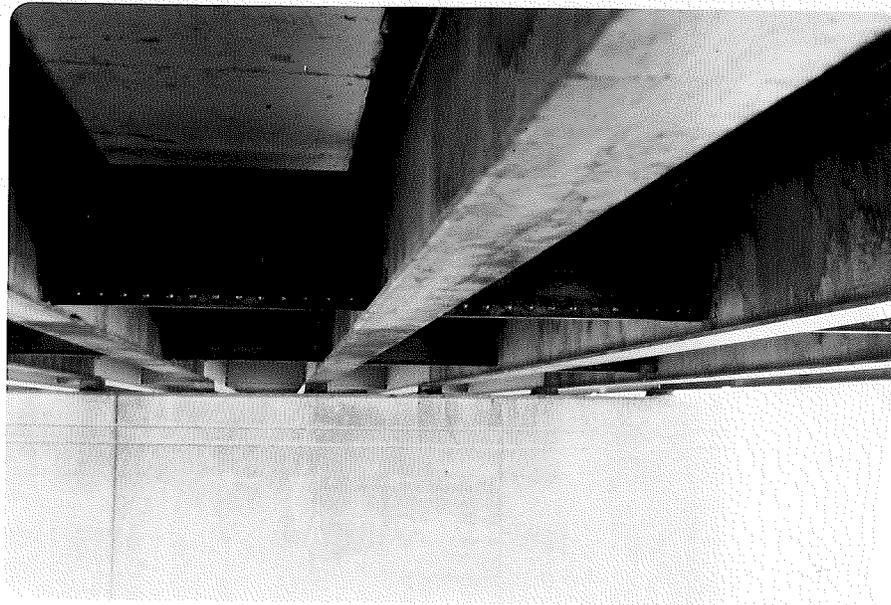


Figure 3. Bleeding and discoloration of aluminum topcoat over tar intermediate coat of System 4 (Shiawassee River bridge).