

MICHIGAN  
STATE HIGHWAY DEPARTMENT

Interoffice Communication

August 5, 1957

TO: W. W. McLaughlin  
Testing and Research Engineer

SUBJECT: Rusting of Steel Beam Guard Rail on Ford  
and Lodge Expressways  
Research Project 49 G-50(4) Report No. 280

Receiving a complaint about the premature rusting of the double steel-beam guard rails, which were installed in the divider strip of the Ford and Lodge Expressways in Detroit during the latter part of 1956, we inspected the installations on July 2, 1957.

At the time of inspection we found that the double beam railings were installed at only certain areas along the two Expressways. A small portion of the installed railing was not top coated in the field over the factory applied primer paint and was rusted quite badly as shown in Figure 1.

Figure 1 shows that both the exterior and interior faces of the beam railing were rusted which signifies that the primer paint was poor in rust inhibition and was also applied in too thin a film: Actual measurement confirmed the latter conclusion by showing a primer film thickness of only 0.5 to 1.0 mils.

The greater part of the installed beam railing had been field coated with one coat of apparently a white paint which at the time of inspection looked a dirty gray because of the large amount of road dirt that was stuck on it. A paint maintenance crew on the Lodge Expressway stated that the field coated portions were painted with an MSHD specified white paint of the No. 6B-4 type. Because of the prevailing cold weather during field coating the slow drying character of this white paint was accentuated to produce a tacky surface for a period long enough to accumulate large amounts of divider-strip and road dirt blown on it by winds and traffic. Excessive rusting was present on these field coated railings also. This rusting was believed to be caused by the poorly primed surface and perhaps to poor preparation of the railing surface prior to field thickness amounted to about 3 mils. Figure 2 shows the maintenance crew painting field coated railing with a second coat of a fast drying aluminum paint on the Lodge Expressway on July 2, 1957. This operation took place several months after application of the first field coat.

While discussing this problem after the inspection, Messrs. Finney and Shaefer advised examination of the coatings on some of the oldest installations of beam railings on our trunklines for comparison purposes. Accordingly the beam railings on M-50, M-52 west of Tecumseh were inspected on July 10, 1957. These painted beam railings, about four years old, were found to be in very good con-

dition as shown in Figure 3. By field measurement the front or roadside faces had an average total thickness of paint of 5 to 8 mils while the backs had a topcoat of black paint and had a total thickness of 2 to 3 mils, which was also in very good condition. A steel beam railing approach to Bridge XI and B1 of 38-1-14 (1949) north of Jackson on US-12 was also found to be in comparatively good condition and had a total paint thickness of about 10 mils: This beam railing was offset from the posts by steel brackets.

Newly installed beam railing on US-127 south of Mason was also examined. It was observed on one 500 foot section between stations 106+00 and 1055+00, which was factory primed but not field coated, that there were at least two different batches of primer paint. The coating condition of the poorer of the two batches is shown in Figure 4, which shows fairly large amounts of rusting that would be difficult to allay by subsequent top coating in the field with the presently specified MSHD No. 6B-4 white paint.

#### Conclusions:

The coatings on the steel beam railings on the Ford and Lodge Expressways are prematurely in poor condition because of the following factors:

1. The rush to install the railings in cold weather did not provide time nor the proper drying conditions for application of the specified number of field coats of paint.
2. The steel beams were not primed and field coated with paints of sufficient rust inhibitive quality or thickness for the prevailing conditions.
3. The primer itself may have been inadequate since it has been observed that manufacturers of steel beam railing shop coat their products with primers having different rust inhibitive qualities.
4. Figure 1 shows that maintenance painting of the interior faces of the observed double beam railing would be difficult because of the limited space between beams.

#### Recommendations:

It is recommended that a closer control be exercised over the quality and thickness of primers that are applied over beam railings. Use of a chemical surface treatment or phosphatizing treatment on the steel beam railings prior to priming should be studied for primer improvement. It is recommended that more rust inhibiting ability be included in the beam paint system by substituting MSHD No. 1-A paint, or faster drying modification, for the first field coat of the specified No. 6B-4 white paint. The possibility of providing more space between double beam railings should be studied to facilitate necessary maintenance painting.

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Figure 1. Primed but not field coated railing on West Ford Expressway; installation about 1/2-year old. Dark areas denote rusting.

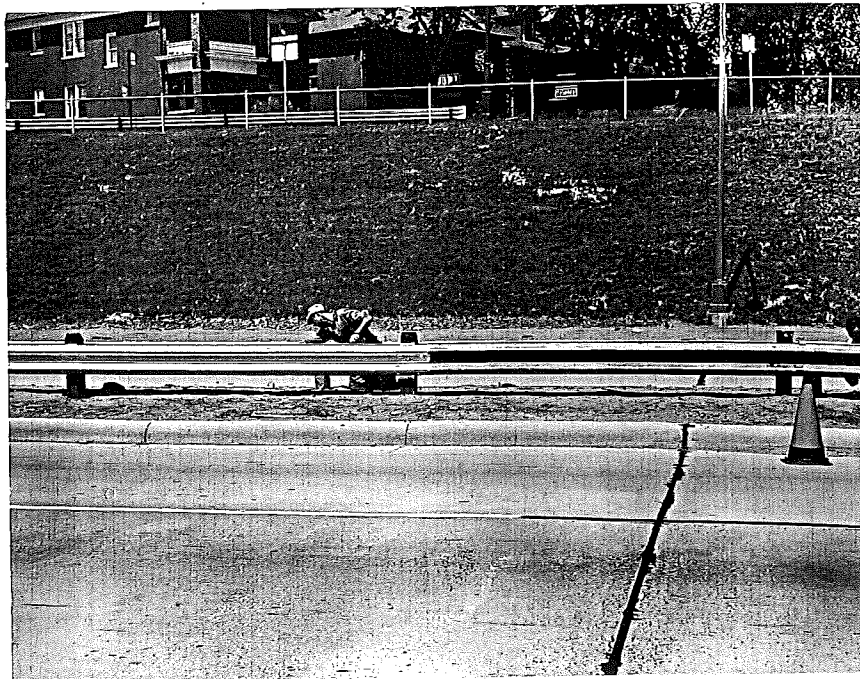


Figure 2. Top coating of beam railing with second field coat on Lodge Expressway. Rust has penetrated first field coat.



Figure 3. Condition of beam railing on M-50, M-52, west of Tecumseh; installation about four years old. Coating in good condition.



Figure 4. Newly installed factory primed, but not field coated railing on US-127; Station 1056/60. Dark areas denote rusting.