

MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

December 27, 1971

To: Traffic Control Devices Committee:

H. H. Cooper, Chairman

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Subject: 1971 Performance Tests of "Fast-Dry" White Pavement Marking Paints. Research Project 47 G-36 (24a). Research Report No. R-798.

The Department purchased one-drum test quantities of "Fast-Dry" white pavement marking paint from nine producers for subject tests, with the paints meeting requirements of applicable specifications dated April 14, 1971. Included in the shipments were 1-gal quantities to the Research Laboratory for research, and for reference purposes on next-year purchases covering roadway marking requirements.

Traffic Field Services applied the test paints transversely across two lanes of four-lane divided M 78, east of Lake Lansing Road, on the concrete lanes on July 29, 1971; and on the westbound bituminous lanes on July 30, 1971 (Fig. 1). Each paint was applied in sets of triplicate or more stripes, as is customary.

The late-in-season applications were due to problems experienced by Traffic Field Services in assembling a suitable test applicator. This was necessitated by the ungainliness of the standard roadway striper for this purpose and its less than satisfactory application of the test transverse lines in the 1970 tests, as mentioned in Research Report No. R-760.

The applicator consisted of a Grayco, portable, airless, hot-spray equipment utilizing a 30 to 1 pressure ratio. The spray gun tip was marked No. 163-323. The heater, a recirculating type, was rated 2100 watts on 110 ac, with a thermometer range of 0-250 F. The equipment was a fortuitous pick-up from the Department's excess property. Subsequently, a holding tank for glass beads and a bead spray-gun were added to the equipment, shown in Figure 2. As used, the equipment did not contain the precise controls for film thickness and bead ratio as the applicator for test regular-dry paints, but the consensus was that it did the job, especially considering its initial use. (Measurements taken on bituminous striping with a gage indicated a 15 to 17 mil wet thickness for all). Some improvements will be incorporated in the equipment to eliminate the stripe-width surges that were produced on several paints in this year's tests (Fig. 3).

Inspections of the test lines were made by members of the standard rating team a short time after application, and at varying intervals thereafter. The intervals at which the ratings were made and the respective ratings are shown in Table 1; the ratings given being averaged for the two locations and the raters. The right-hand column of the Table lists the drying-times of the paints as determined by an auto passing over the stripes, as per specification requirement.

In an effort to discern differences in performance of the test paints, the rating intervals were shortened during the November-December period when studded tires begin appearing on vehicles. How these tires and the accompanying winter weather deteriorate the paint stripes can be discerned in graphs of Figures 4a plotting durability against exposure time for an average of all the paints, and for one of the better performers and one of the poorer performers. Actually, the fast deterioration of the paint stripes after the November 11 rating can be ascribed mostly to studded tires, though winter weather is tougher on paint stripes than summer weather as can be seen in comparable graphs of paint stripe performance in reports before 1968. The accompanying night visibility values for the same paints are graphed in Figure 4b.

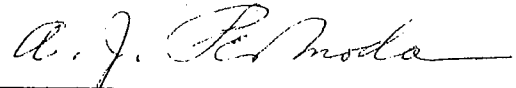
At the conclusion of the tests, the condition of the paint stripes was noticeably poorer on the concrete roadway than on the bituminous roadway across the road, as shown in Figure 5.

Conclusions and Recommendations

The report test result ratings and data are presented to act as a basis for 1972 purchases by the Department of "Fast-Dry" paints. The recorded drying times of the test paints show that none actually met the specification requirement of 1 minute, maximum.

The test results show that the slower drying paints outperformed the faster drying ones. However, both show accelerated deterioration under wear from studded tires.

TESTING AND RESEARCH DIVISION



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TABLE 1
TEST PAINT RATINGS

Paint* Identi- fication No.	4-day Ratings ¹		41-day Ratings		74-day Ratings		106-day Ratings		125-day Ratings		139-day Ratings			Drying Time, ² min.										
	App.	N. V.	Dur.	N. V.	W. R.	App.	N. V.	W. R.	App.	N. V.	W. R.	App.	Dur.		N. V.	W. R.								
1	8.8	10	8.4	7.3	10	6.6	8.0	7.9	9.9	5.5	7.5	9.3	3.9	6.4	6.7	5.8	2.8	2.8	4.4	2.1	2.3	1.4	1.8	3
2 ³	7.5	10	6.6	7.7	10	5.0	7.3	7.5	9.2	2.7	5.8	7.2	2.9	5.1	5.7	4.7	1.8	3.4	3.4	1.9	2.4	1.1	1.7	5+
3	8.0	10	8.4	6.6	10	6.8	8.0	7.2	9.7	5.9	7.6	6.6	3.8	6.1	6.4	5.0	3.2	4.2	4.2	2.2	2.3	1.7	2.0	3
4	8.0	10	8.0	6.5	10	7.2	8.2	6.6	9.7	7.0	8.0	5.8	5.3	6.7	5.3	5.4	4.0	4.7	4.7	1.5	1.8	1.7	1.7	5+
5	7.5	10	8.0	6.3	9.7	6.3	7.6	5.6	8.7	5.3	6.7	4.2	4.2	5.6	3.6	4.1	1.5	2.8	2.8	0.6	1.0	0.2	0.6	1-1/2
6	8.2	10	7.5	7.0	10	6.5	8.0	7.0	9.9	7.0	8.2	7.6	5.0	6.8	5.8	5.4	2.9	4.2	4.2	2.2	2.1	1.2	1.6	5+
7	9.0	10	5.8	7.8	10	3.7	6.7	7.7	9.4	3.0	6.0	7.2	2.3	5.2	5.0	4.1	1.4	2.8	2.8	0.7	0.8	0.3	0.6	1-1/2
8	8.8	10	7.0	7.2	10	5.2	7.3	7.4	9.6	4.6	6.9	7.8	3.8	6.2	5.1	4.2	2.1	3.2	3.2	1.3	1.5	0.6	1.0	1-1/2
9 ³	8.0	10	7.4	7.1	10	5.1	7.2	6.8	9.2	5.1	6.9	7.6	3.4	6.0	7.1	7.0	2.6	4.8	4.8	3.2	3.2	1.8	2.5	5+

Paints bought for 1971
highway striping

White
Black

*Paint Identifications: 1 = Prismo; 2 = Sherwin-Williams; 3 = Wm. A. Smith; 4 = Celanese; 5 = Glidden; 6 = Std. Detroit; 7 = Forman Ford; 8 = Baltimore; 9 = Perry & Derrick.

¹ Ratings: App. = Appearance; Dur. = Durability; N. V. = Night Visibility; W. R. = Weighted Rating.

² Drying Time determined on longitudinal striping with auto tire, as per specifications.

³ Paint was difficult to apply in test equipment, yielding varying width stripes, though application was satisfactory in roadway striping equipment.



Figure 1. General initial appearance of test performance stripes on bituminous pavement of WB M 78, near Lake Lansing Rd.

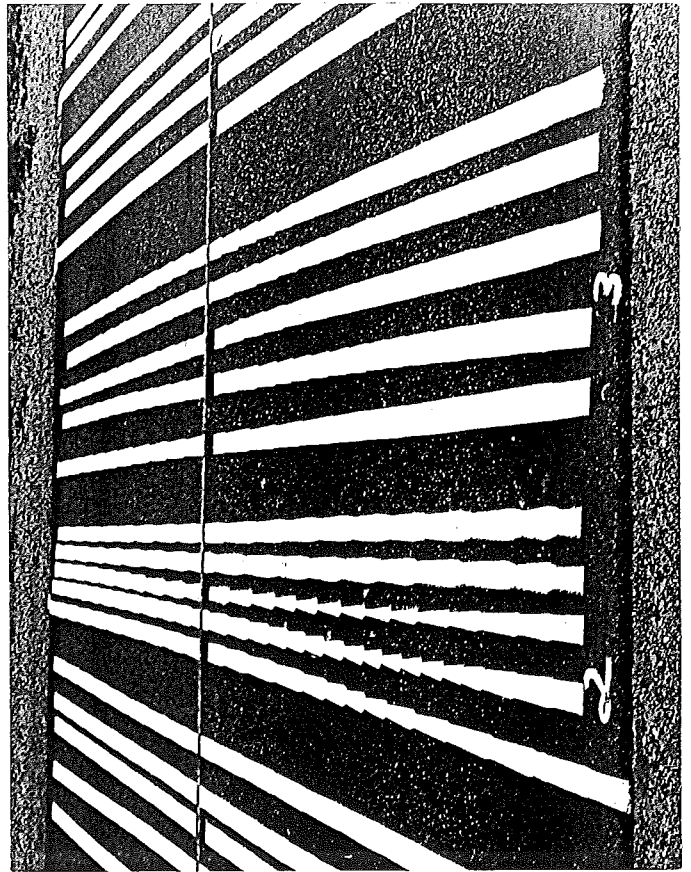


Figure 3. Detailed initial appearance shows stripe-width surges laid-down by spray equipment; very distinct on set No. 2, less distinct on No. 3. Bordering sets Nos. 1 and 4 appear OK, on the bituminous area.

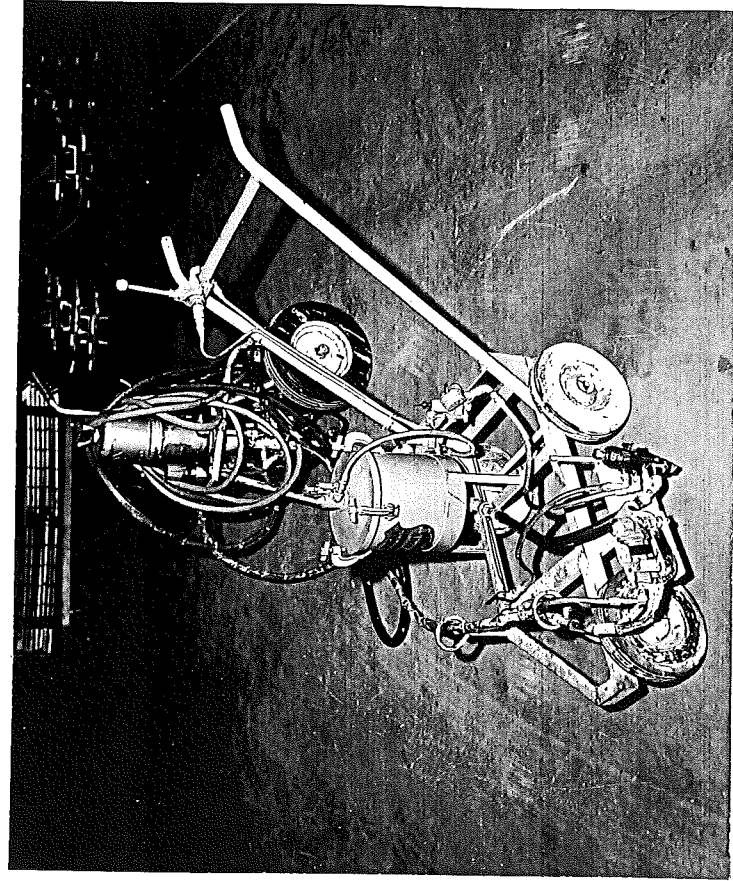


Figure 2. Application equipment used in tests. The movable tri-cycle in the foreground has the spray gun, bead tank and gun. The equipment in the background is the Grayco pump and heater, stationary during application. The supplementary compressor and generator are not shown.

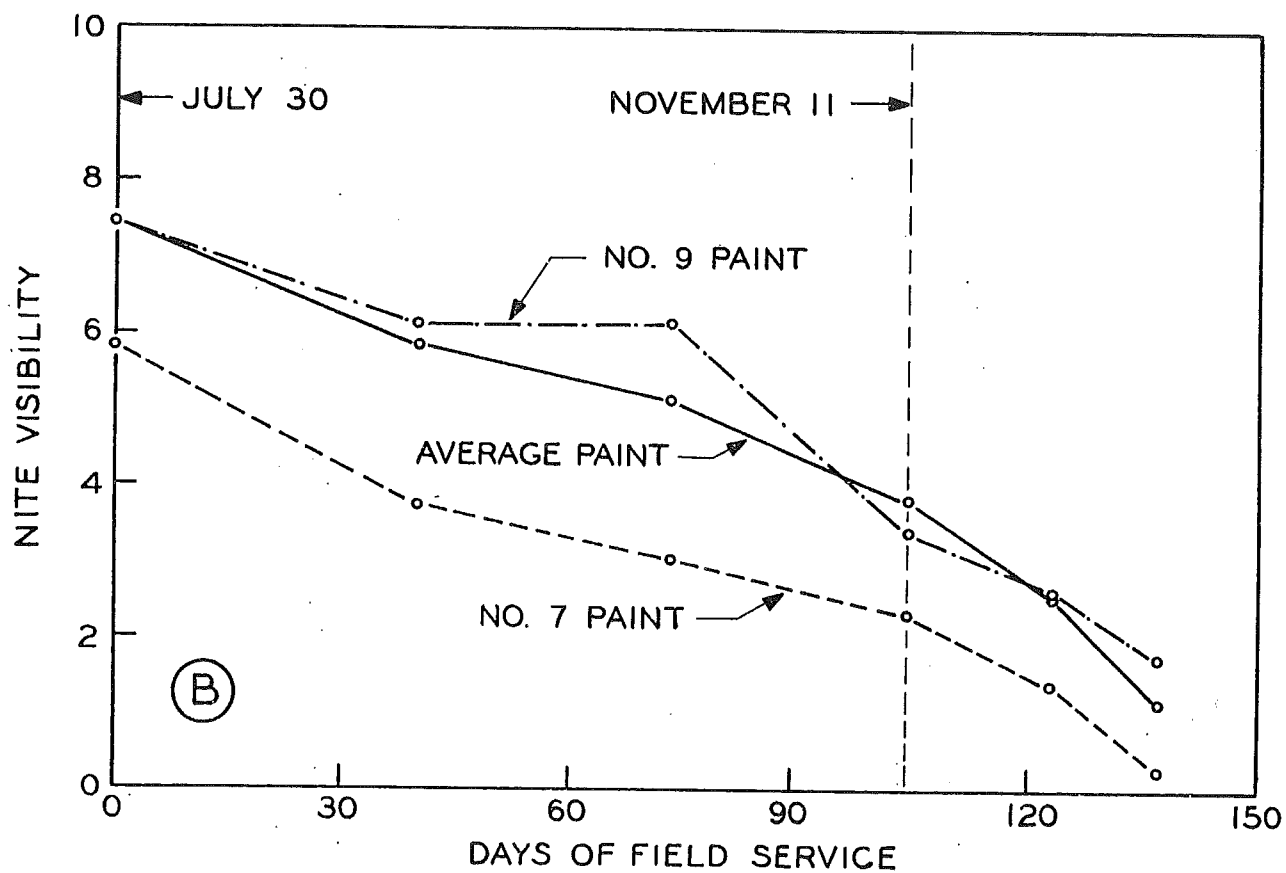
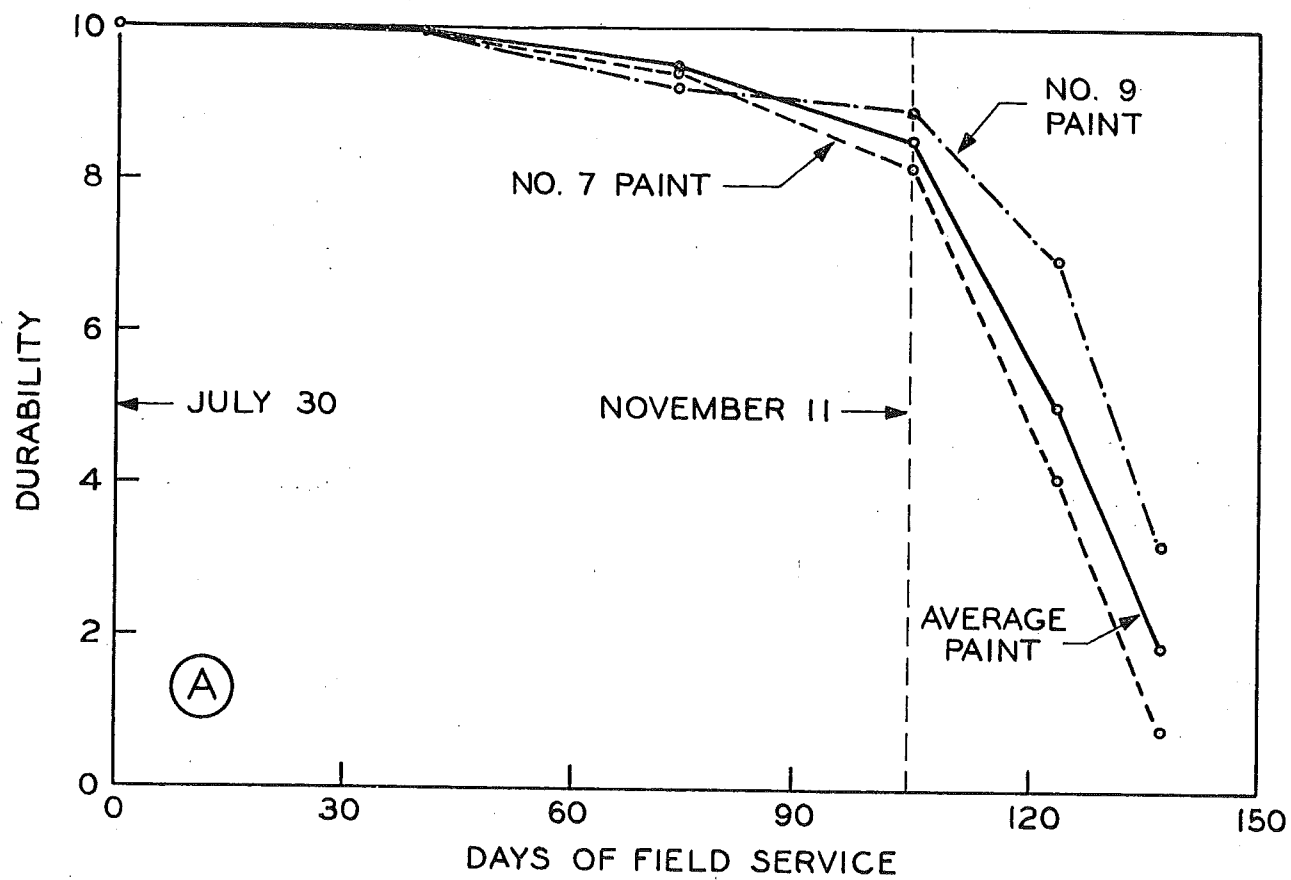


Figure 4. Field service for some test paints vs. durability and night visibility.

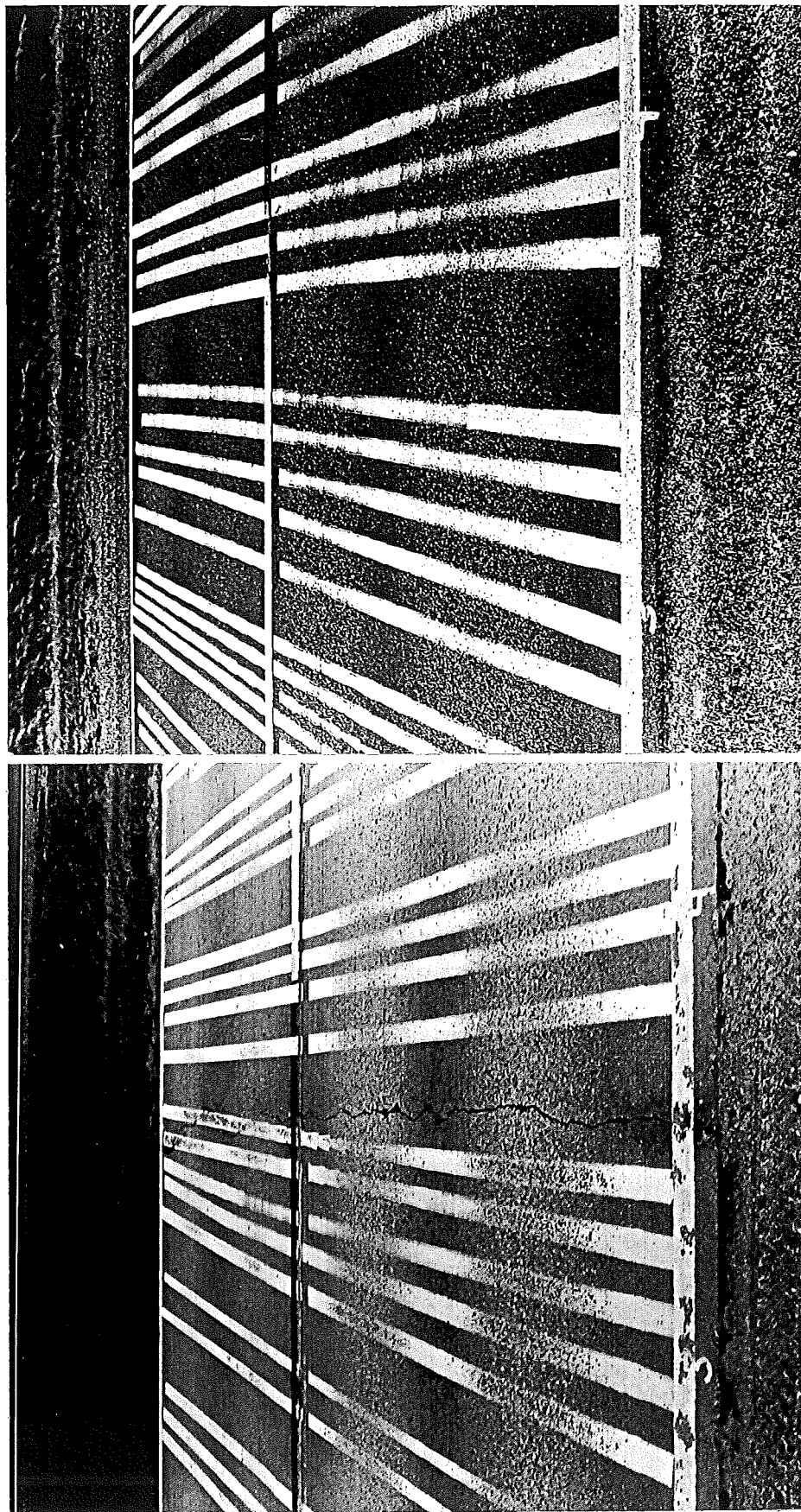


Figure 5. Condition of stripes after 139 days of service on M 78, a) concrete (left), and b) bituminous (right). The tire-track areas on the concrete show more deterioration than on bituminous for the same test paints.