MSHD Report No. 194
Office of Testing and Research

1964 PERFORMANCE TESTS ON WHITE AND YELLOW TRAFFIC PAINTS
(Including Cooperative Tests in Detroit and Wayne County)

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Research Projects 47 G-36(17) and (17a)
Research Report No. R-559

Michigan State Highway Department
Lansing, November 1965

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The following nine producers submitted paints for the 1964 tests:

1. Argo Paint & Chemical Co. of Detroit
2. Baltimore Paint & Chemical Co. of Baltimore
3. Glidden Co. of Cleveland
4. Jaegle Paint & Varnish Co. of Philadelphia
5. Prismo Safety Corp. of Huntingdon, Pennsylvania
6. Standard Detroit Paint Co. of Detroit
7. Stiles Paint Co. of Kalamazoo
8. Tropical Paint Co. of Cleveland
9. Truscon Division of Devoe & Raynolds of Detroit

The list is shorter than last year since four producers (Acme, Boydell, DeSoto, and Wm. Armstrong Smith) were deleted because of poor past performance, while one producer (Tropical Paint Co.) was added. No additional paints were field evaluated this year.

Qualification Tests

All submitted paints were evaluated for conformance with qualification requirements given in the governing specifications dated April 23, 1963 with amendment of April 24, 1964. Laboratory qualification tests covered color, reflectively, consistency, bleeding, settling, and vehicle stability, while field qualification tests covered drying time and applicability in regular highway striping equipment. Results of the qualification tests are given in Table 1, which shows (as reported to the Committee in Research Report No. R-506 dated April 14, 1965) that the following paints were borderline or failed to meet one or more of the requirements:

White Paints

No. 68--Borderline bleeding index on tar base.
No. 70--Excessively low settling index.
No. 72--Borderline settling index.
No. 76--Borderline settling index.
No. 84--Borderline bleeding index on asphalt base.

TABLE 1
QUALIFICATION TEST RESULTS
1964 Performance Paints

	Paint No.	Fluorescence	Dominant Wavelength, mμ	Reflectivity, percent	Consistency KU - 77 F	Bleeding Index		Settling Index	Avg. Field Drying Time, minutes	Applicability*
						Asphalt	Tar			
White Paints	68	minor		83.1	82	6.0	4.0	9	25	satisfactory
	70	minor		90.0	73	4.5	5.8	5	18	satisfactory
	72	minor		92.4	72	5.5	5.5	6	21	satisfactory
	74	minor		88.3	82	5.3	5.1	8	16	satisfactory
	76	strong		87.5	73	4.8	5.0	6	21	satisfactory
	78	none		82.6	82	4.3	6.0	7	19	satisfactory
	80	minor		81.5	78	5.0	4.9	9	33	satisfactory
	82	minor		84.7	78	4.9	6.0	9	20	satisfactory
	84	strong		84.8	77	4.0	4.8	9	24	satisfactory
Yellow Paints	67	none	581.6	56.3	82	8.5	6.0	9	29	satisfactory
	69	none	582.2	55.9	72	6.8	6.0	8	18	satisfactory
	71	none	581.4	58.7	71	6.5	6.3	8	28	satisfactory
	73	none	582.0	54.7	81	6.9	7.0	9	20	satisfactory
	75	none	581.4	57.9	76	8.5	7.8	8	25	satisfactory
	77	none	582.5	50.0	86	5.0	6.1	6	15	satisfactory
	79	minor	581.3	49.4	78	7.8	5.8	9	29	satisfactory
	81	minor	581.5	56.8	74	6.3	7.0	9	20	satisfactory
	83	none	582.5	54.7	78	8.0	6.6	9	26	satisfactory

* In field striping equipment as determined by field crew.

Yellow Paints

No. 71--Borderline in meeting color standard.
No. 77--Borderline settling index and in meeting color standard.
No. 79--Borderline in meeting color standard.

Field Application

All paints submitted for the 1964 tests were deposited in the four field areas between August 6 and 14, 1964. The test stripes, covering two adjoining lanes of four-lane roadways, were applied in the same road areas used in 1963, as shown in Fig. 1. Deposition details for the test paints in the performance areas were standard, in that each was applied as a set of three 4-in. wide stripes at a 15-mil thickness, having glass beads "dropped on" in ratio of 6 lb per gal of paint. Subsequently, 45-gal amounts of each paint purchased for tests were applied as longitudinal striping by a District striping crew, for evaluation of handling and application characteristics in highway striping equipment.

Field Performance Ratings

Test stripes deposited in the four performance areas (Fig. 2) were rated seven days after application and at three-month intervals thereafter over a period of one year. Quality ratings of the test paints in the four areas, averaged from evaluations of the four observers, are given in Table 2. These averaged quality values for the individual paints were then used to calculate the respective weighted ratings, also listed in that table.

Field Test Results

Table 3 presents performance indicators expressed as calculated service factor values, listed in descending order of terminal "Percent of Best" values for all tested 1964 paints. Half-year and one-year service factor values for the paints are given in the table, which also contains a column tabulating results of the previously mentioned qualification tests.

The "Qualification Tests" column in Table 3 shows that only one paint, a white, failed to meet all specification requirements; a few additional whites and yellows were borderline, as mentioned earlier. This compliance to requirements is better than average.

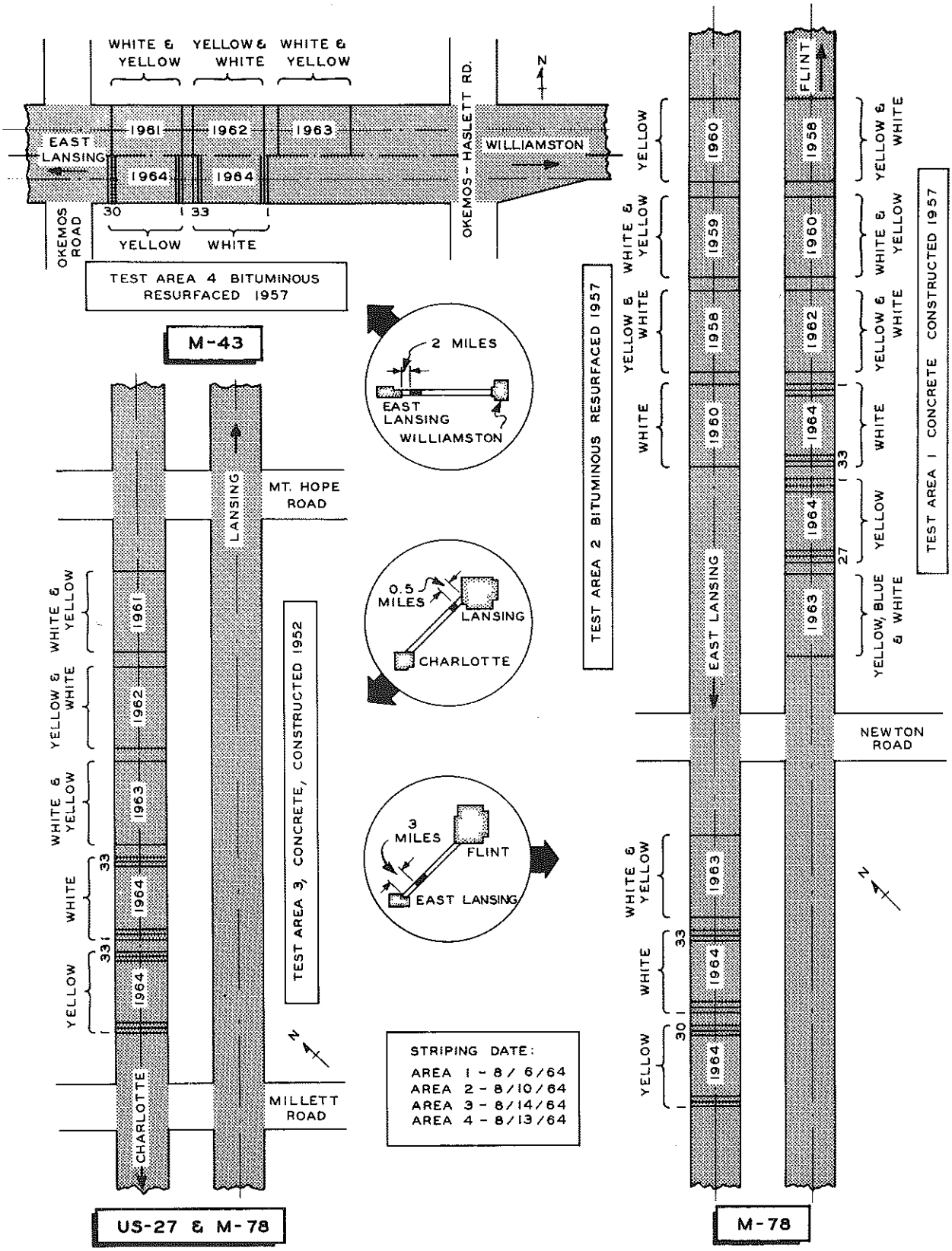
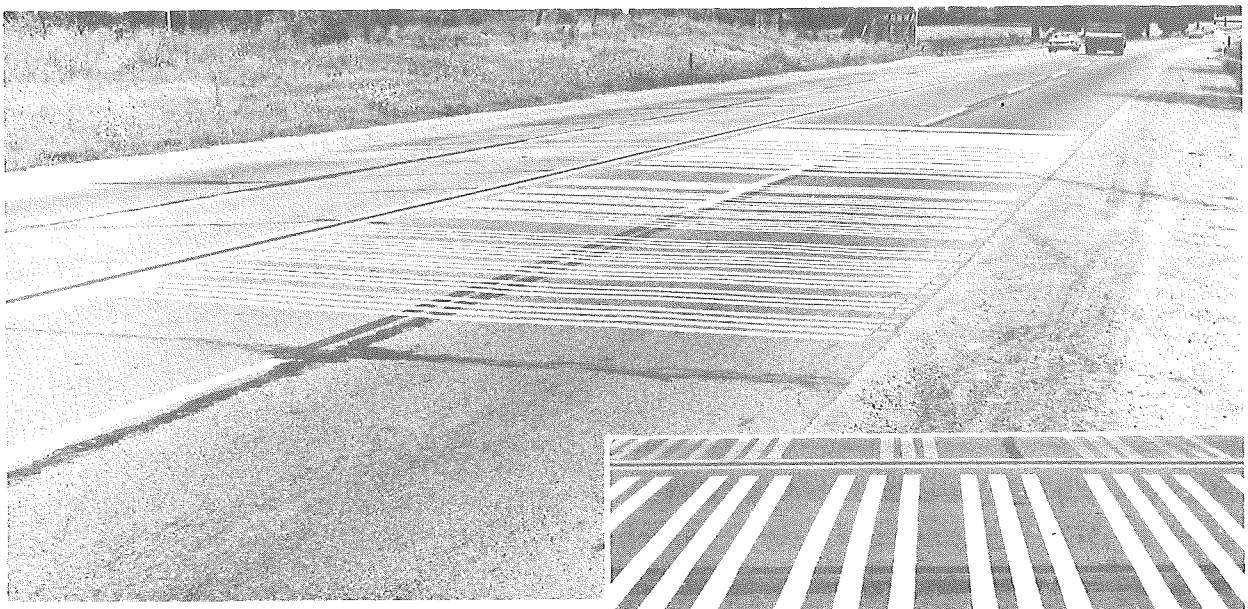


Figure 1. Location of 1964 Traffic Paint Performance Test Areas.



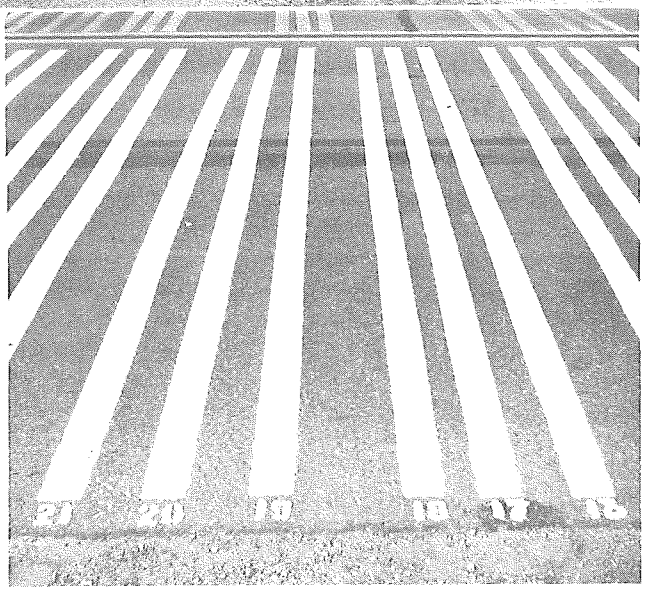


Figure 2. Initial appearance of stripes in Test Area 4 (bituminous) on M 43 near Okemos (above), with yellows in foreground and whites in background. Close view of some white stripes is shown at right.

Figure 3. Poor durability of Detroit stripes after six months of exposure (below). Stripes were deposited in duplicate--beaded and unbeaded.

TABLE 2
PERFORMANCE RATING DATA
1964 Tests

	Exposure Days	Factor Evaluated	White Paint Numbers										
			68	70	72	74	76	78	80	82	84	84(a)	182
White Paints	7	General Appearance	9.2	8.6	9.1	9.4	8.6	9.4	9.0	8.8	8.9	8.7	8.8
		Durability	10.0	9.4	9.6	10.0	9.8	10.0	10.0	10.0	10.0	10.0	9.9
		Night Visibility	6.4	6.3	5.3	6.2	7.0	7.1	7.5	7.8	8.0	7.2	7.9
		Weighted Rating	8.1	7.8	7.4	8.0	8.3	8.5	8.7	8.8	8.9	8.5	8.8
	100	General Appearance	6.6	5.7	5.6	7.5	6.7	7.1	7.1	6.5	6.7	6.4	6.6
		Durability	8.5	6.5	6.5	8.6	8.4	8.8	8.5	8.6	8.9	8.4	8.7
		Night Visibility	6.4	5.4	5.4	7.1	6.4	6.9	6.8	7.2	6.9	6.8	6.9
		Weighted Rating	7.3	5.9	5.9	7.7	7.2	7.7	7.5	7.7	7.7	7.4	7.6
	198	General Appearance	4.8	2.6	2.0	5.1	5.7	6.0	5.6	5.7	5.7	6.2	5.6
		Durability	5.4	3.2	2.3	5.5	6.8	7.2	6.4	6.8	6.8	7.4	6.6
		Night Visibility	3.0	1.6	1.4	3.6	4.2	4.0	3.7	4.4	3.9	4.6	3.9
		Weighted Rating	4.1	2.3	1.8	4.5	5.4	5.5	5.0	5.5	5.2	5.9	5.2
		Service Factor	67.1	54.8	52.5	70.2	70.4	73.4	71.7	74.2	73.8	73.0	72.9
	282	General Appearance	3.9	1.7	1.6	3.4	4.7	6.0	5.1	5.0	5.2	6.0	4.6
		Durability	4.4	1.8	1.6	3.7	5.6	6.6	5.4	5.8	5.5	7.1	5.2
		Night Visibility	1.8	0.7	0.6	2.0	2.8	2.9	2.4	3.2	2.2	4.8	2.1
		Weighted Rating	3.1	1.2	1.1	2.8	4.1	4.7	3.9	4.4	3.8	5.8	3.6
	376	General Appearance	3.3	1.0	0.9	2.8	3.5	4.9	4.1	3.6	4.0	4.4	3.6
		Durability	4.1	1.0	1.0	3.1	4.4	5.3	4.3	4.7	4.8	6.5	4.4
		Night Visibility	1.6	0.3	0.3	1.8	2.6	2.5	1.9	2.9	1.8	5.1	1.8
		Weighted Rating	2.8	0.6	0.6	2.4	3.4	3.9	3.1	3.7	3.2	5.6	3.0
		Service Factor	52.4	37.2	35.3	53.5	58.1	62.0	57.8	61.6	59.2	66.7	57.8
			Yellow Paint Numbers										
			67	69	71	73	75	77	77(b)	79	81	83	183
Yellow Paints	7	General Appearance	8.7	9.3	9.1	9.6	8.6	9.3	9.5	9.2	9.3	9.4	9.1
		Durability	9.5	9.9	9.9	10.0	9.8	10.0	10.0	10.0	10.0	10.0	9.9
		Night Visibility	6.9	6.9	6.4	6.5	7.4	6.7	5.8	7.3	8.2	8.2	7.3
		Weighted Rating	8.1	8.3	8.1	8.2	8.5	8.3	7.9	8.6	9.0	9.0	8.5
	100	General Appearance	6.7	7.4	7.3	7.3	7.2	7.5	7.5	7.6	7.5	7.0	6.9
		Durability	8.2	8.7	8.5	8.5	8.5	9.0	9.8	8.8	9.0	8.9	8.5
		Night Visibility	6.6	6.3	6.4	6.4	6.3	6.3	6.8	6.5	7.4	7.4	6.5
		Weighted Rating	7.3	7.4	7.3	7.8	7.3	7.5	8.1	7.5	8.1	8.0	7.3
	198	General Appearance	5.1	4.0	4.0	4.8	5.3	5.9	6.3	5.2	5.9	6.3	5.0
		Durability	5.8	4.7	4.6	5.3	6.0	7.3	8.0	5.9	7.0	7.2	6.1
		Night Visibility	3.3	3.0	2.8	3.0	4.2	3.9	5.9	3.1	4.4	4.4	3.7
		Weighted Rating	4.5	3.8	3.6	4.1	5.0	5.5	6.8	4.4	5.6	5.7	4.8
		Service Factor	67.9	67.3	66.1	70.0	70.2	71.9	87.1	70.3	76.9	76.8	70.1
	282	General Appearance	4.6	2.6	3.3	4.2	4.9	6.0	6.8	4.1	5.5	6.0	4.6
		Durability	5.0	3.0	3.4	4.5	5.6	7.0	8.0	4.5	6.3	6.7	5.2
		Night Visibility	1.7	1.1	1.3	1.8	2.9	2.8	2.6	1.5	2.6	3.3	2.2
		Weighted Rating	3.3	2.0	2.3	3.1	4.2	4.8	5.2	3.0	4.4	4.9	3.6
	376	General Appearance	4.1	1.7	3.0	3.3	3.7	5.0	6.3	3.2	4.3	5.0	3.4
		Durability	4.4	2.3	2.8	3.7	4.8	6.1	7.4	4.0	5.3	5.7	4.6
		Night Visibility	1.2	0.9	1.0	1.4	2.2	2.2	1.5	1.1	2.4	3.3	1.8
		Weighted Rating	2.8	1.5	1.9	2.5	3.4	4.0	4.3	2.5	3.8	4.4	3.1
		Service Factor	53.6	48.4	48.9	54.0	58.0	61.5	71.9	53.8	63.1	65.3	56.2

(a) Special additive to white paint (four test areas).
(b) Special high-intensity colorless beads in yellow paint (one test area).

TABLE 3
SERVICE FACTORS AND TERMINAL RATINGS
1964 Performance Paints*

	Paint No.	1963 Service Factor (372 Days	Service Factor Difference (1963-64)	1964 Service Factors		Terminal Percent of Best	Qualification Tests
				198 Days	376 Days		
White	78	65.1	- 3.1	73.4	62.0	100.0	Passed
	82	64.3	- 2.7	74.2	61.6	99.4	Paint Passed Beads Passed
	84	67.9	- 8.7	73.8	59.2	95.5	Passed
	76	68.3	-10.2	70.4	58 1	93.7	Passed
	80	60.5	- 2.7	71.7	57.8	93.2	Passed
	74	69.9	-16.4	70.2	53.5	86.3	Passed
	68	61.0	- 8.6	67.1	52.4	84.5	Passed
	70	--	--	54.8	37.2	60.0	Failed
	72	58.3	-23.0	52.5	35.3	56.9	Passed
			Avg. - 9.4				
	182(a)	66.2(b)	- 8.4	72.9	57.8	93.2	Passed
Yellow	83	71.8	- 6.5	76.8	65.3	100.0	Passed
	81	65.6	- 2.5	76.9	63.1	96.6	Paint Passed Beads Passed
	77	64.4	- 2.9	71.9	61.5	94.2	Passed
	75	66.5	- 8.5	70.2	58.0	88.8	Passed
	73	69.7	-15.7	70.0	54.0	82.7	Passed
	79	64.5	-10.7	70.3	53.8	82.4	Passed
	67	62.2	- 8.6	67.9	53.6	82.1	Passed
	71	64.7	-15.8	66.1	48.9	74.9	Passed
	69	--	--	67.3	48.4	74.1	Passed
			Avg. - 8.9				
	183(a)(c)	69.9(b)	-13.7	70.1	56.2	86.1	Passed
	84(d)	--	--	73.0	66.7	107.6	--
	77(e)	--	--	87.1	71.9	110.1	--

(a) Same as paint purchased for 1964 traffic striping.
(b) Value obtained in 1962 tests, using same areas as 1964.
(c) Applied in only three test areas.
(d) Special additive to white paint (four test areas).
(e) Special high-intensity colorless beads, in yellow paint (one test area).
* All paints applied at rate of 16.5 gal per mi. of 4-in. stripe; 6 lb of MSHD Type 3 beads dropped on per gallon. Field areas same as in 1963 tests.

The Table 3 column listing the terminal service factor values of paints in the previous year's tests (1963) is given for comparison of performance of a producer's products during the last two performance tests. Comparison shows that every 1964 sample rated lower than its 1963 counterpart as shown in the table. The range for the whites was -2.7 to -23.0 with an average of -9.4; for the yellows the range was -2.5 to -15.8 with an average of -8.9. For some individual paints the lowering of service factor can be ascribed to a change in formulation, but the general lowering must be due to a combination of several factors including an increase in traffic volume, generally poorer formulations, changes in rating personnel, and peculiar weather which was hard on performance paints as confirmed by cooperative tests in Detroit and Wayne County. As before, the current tests included stripes of samples of the white and yellow traffic paints purchased for Departmental 1964 roadway striping, for information on reproducibility of ratings, and for a check on analytical methods employed in acceptance testing. A comparison of data shows that the white paint rated 8.4 points lower than in 1962 tests, and the yellow paint rated 13.7 points lower. It is assumed that these differences can be ascribed to this year's general lowering of performance indicators.

As is customary, no recommendation is being made concerning regular performance paints to be selected for bids.

Experimental Paints and Beads

No special or experimental paints were evaluated in this year's tests, including those in Detroit. However, preliminary field testing for information was conducted on two products, as noted in the tables:

1. A special paint additive (64 PR-91), to note its effect on improvement of durability, in one white paint in all four test areas, and

2. Brief evaluation of experimental, high-intensity, colorless glass beads (64 MR-186), in one yellow paint in only one test area.

Cooperative Tests with Wayne County and with Detroit

In accord with previous arrangements, and as in the past, the Department cooperated with Wayne County and with Detroit in performance striping.

For Wayne County this consisted of assistance in application of their paint samples with the Laboratory striper plus subsequent casual observation of their performance up to the terminal level of 6 to 7 months. Thirteen whites and thirteen yellows, plus MSHD controls, were applied as triplicate, beaded stripes, in two test areas including one concrete and one bituminous area. Performance was very poor on the blacktop of Schoolcraft Road, due partially to poor selection of test site; and better, though poorer than usual, on concrete of Beech-Daly Road. The three white and one yellow MSHD control paints gave good to excellent performance, though MSHD yellow acceptance paint gave only fair performance.

For Detroit the cooperation consisted of the following:

1. Laboratory equipment and operators assisted in application of Detroit performance paints on August 25, 1964. This test was the basis for the 1965 purchases. Twenty-two whites and twenty-two yellows, plus MSHD controls, were applied in quadruplicate in two beaded and two unbeaded stripes. Paints were applied in the customary single area, the sheet asphalt roadway on Oakland Avenue.

2. On October 27, 1964 another test application was made, which was to serve as a basis for 1966 purchases. Fifteen whites and sixteen yellows, without MSHD controls, were applied in duplicate, consisting of one beaded and one unbeaded stripe. This test application was also on northbound Oakland Avenue, north of the earlier application.

3. The Department's two-man rating crew assisted in the final evaluations, at the eight-month level for the August-applied stripes and the six-month level for the October-applied stripes. Performance of the stripes was poor by previous standards, since no paint had a durability rating of 5 or above in either grouping, except for one MSHD control white paint that had an 8.0 rating (beaded) at the eight-month level. By comparison, about half of last year's paints had durability ratings of 5 or above after eight months of road service. Peculiarly, the general appearance of the August-applied stripes was better than the October-applied stripes (Fig. 3) at the April 29, 1965 rating. For this reason, the October tests were discontinued and not used for subsequent purchases.

The reason for the poor performance of the Detroit paints, which was worse than in the 1964 Department tests, is unknown.