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1965 PERFORMANCE TESTS ON WHITE AND YELLOW TRAFFIC PAINTS
(Including Cooperative Tests in Detroit and Wayne County)

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

The following nine producers submitted paints for the 1965 tests:

1. Argo Paint and Chemical Co. of Detroit
2. Baltimore Paint and Chemical Corp. of Baltimore
3. Forman Ford, Inc. of Minneapolis
4. Glidden Co. of Cleveland
5. Jaegle Paint and Varnish Co. of Camden, New Jersey
6. Prismo Safety Corp. of Huntingdon, Pennsylvania
7. Sherwin-Williams Co. of Detroit
8. Standard Detroit Paint Co. of Detroit
9. Truscon Laboratories of Detroit

Compared to 1964, this list has two deletions, Stiles Paint Co. and Tropical Paint Co., and two additions, Forman Ford, Inc. and Sherwin-Williams Co. No experimental paints were evaluated this year. Two proprietary, high-index, white beads received preliminary field testing.

The 1965 tests differ from past tests in that the Committee authorized each producer to submit two samples of white paint for evaluation, one being his regular product and the other a premium or quality paint of potential value in improving the quality of Michigan striping. The Committee tentatively approved this procedure in accordance with its program to upgrade the quality of the submitted paints.

Qualification Tests

All submitted paints were evaluated for conformance with qualification requirements given in the governing specifications dated May 1, 1965. Laboratory qualification tests covered color, reflectivity, consistency, bleeding, settling and vehicle stability. 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-577 dated April 15, 1966) that the following paints were borderline or failed to meet one or more of the requirements:

TABLE 1
QUALIFICATION TEST RESULTS
1965 PERFORMANCE PAINTS

	Paint No.	Fluorescence	Dominant Wavelength, mμ	Reflectivity, percent	Consistency, KU - 77 F	Bleeding Index		Settling Index	Vehicle Stability	Avg. Field Drying Time, minutes	Applicability In Roadway Striper
						Asphalt	Tar				
White Paints	80	minor		82.1	67	4.7	3.3	8	unsatisfactory	--	--
	82	minor		85.1	71	6.0	4.0	9	satisfactory	24	satisfactory
	84	minor		86.6	82	4.0	5.7	9	satisfactory	31	satisfactory
	86	minor		84.9	81	4.7	5.7	9	satisfactory	34	satisfactory
	88	none		88.5	82	6.7	4.7	8	satisfactory	27	satisfactory
	90	minor		79.7	74	6.3	6.3	9	satisfactory	26	satisfactory
	92	minor		85.6	74	6.3	4.7	9	satisfactory	21	satisfactory
	94	none		93.4	71	2.0	4.0	5	satisfactory	--	--
	96	none		83.3	79	5.3	5.3	7	satisfactory	18	satisfactory
	97	minor		81.9	67	5.7	5.0	8	unsatisfactory	21	satisfactory
	98	minor		82.7	85	5.3	5.3	9	satisfactory	28	satisfactory
	99	minor		84.7	83	7.0	5.3	7	satisfactory	25	satisfactory
	100	minor		86.0	76	6.7	5.0	9	satisfactory	23	satisfactory
	101	none		87.9	86	5.7	6.3	6	satisfactory	40	satisfactory
	102	minor		86.0	76	7.0	5.0	8	satisfactory	25	satisfactory
	103	minor		83.9	82	6.7	5.0	8	satisfactory	30	satisfactory
	104	none		89.3	75	3.7	3.3	9	satisfactory	17	satisfactory
	105	none		81.2	89	6.3	5.7	8	satisfactory	27	satisfactory
Yellow Paints	79	none	583.0	53.2	81	6.3	4.0	6	unsatisfactory	22	satisfactory
	81	none	581.3	50.8	83	5.3	4.7	9	satisfactory	25	satisfactory
	83	strong	581.0	60.4	81	8.3	7.0	9	satisfactory	23	satisfactory
	85	minor	581.7	59.2	81	7.3	7.0	9	satisfactory	30	satisfactory
	87	none	581.5	58.3	74	6.0	5.3	8	satisfactory	28	satisfactory
	89	none	581.9	56.7	86	5.7	5.3	9	satisfactory	30	satisfactory
	91	none	582.5	47.7	71	9.0	6.7	8	satisfactory	33	satisfactory
	93	none	581.9	53.0	74	3.3	5.3	9	satisfactory	--	--
	95	none	582.8	49.5	81	5.7	6.7	7	satisfactory	25	satisfactory

White Paints

No. 80--Low viscosity, low bleeding index on tar base, and failed vehicle stability test (not field tested).
No. 82--Borderline bleeding index on tar base.
No. 84--Borderline bleeding index on asphalt base.
No. 90--Borderline color reflectivity.
No. 94--Low bleeding indexes on asphalt and tar bases, and low settling index (not field tested).
No. 97--Low viscosity and failed vehicle stability test.
No. 101--Borderline: high viscosity, low settling index, and long drying time.
No. 104--Low bleeding indexes on asphalt and tar bases.
No. 105--Borderline high viscosity.

Yellow Paints

No. 79--Borderline: bleeding index on tar base and settling index. Failed vehicle stability test.
No. 81--Borderline low color reflectivity.
No. 83--Questionable in meeting color requirement because of fluorescence and borderline purity.
No. 85--Borderline in meeting color requirement due to minor fluorescence.
No. 89--Borderline high viscosity.
No. 91--Borderline low color reflectivity.
No. 93--Borderline low color reflectivity and low bleeding index on asphalt base (not field tested).
No. 95--Borderline low color reflectivity.

This list shows that 17 of the 27 submitted paints did not meet or were borderline in meeting all specification requirements, which is somewhat poorer than usual.

Field Application

All paints submitted for the 1965 tests were deposited between August 5 and 12, 1965 in four areas, as usual, with two areas on US 27 south of St. Johns substituted for those on US 27-M 78 and on M 43 used in 1964 and earlier tests. Specific locations are shown in Figure 1.

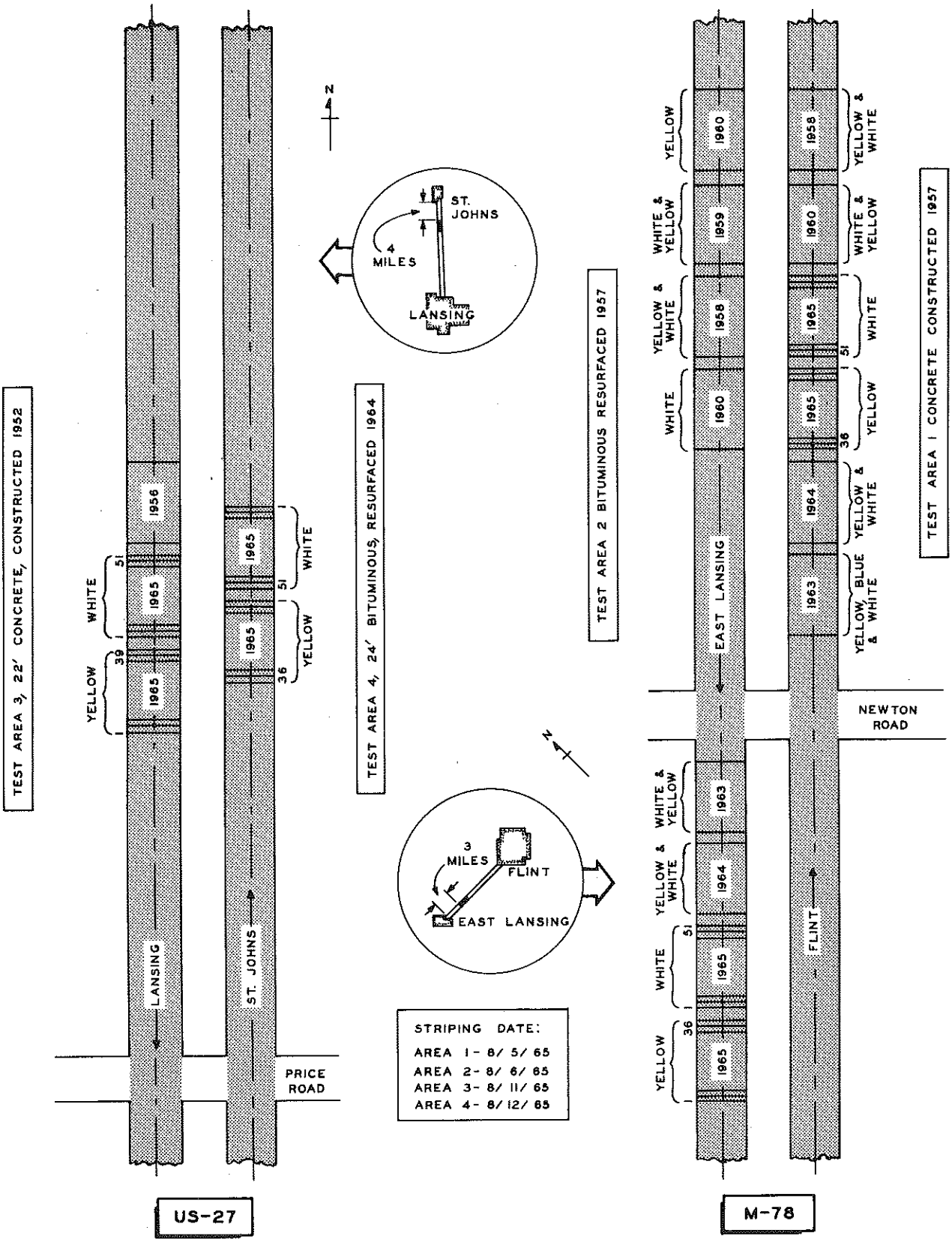

Figure 1. Location of 1965 traffic paint performance test areas.

The road stripes used to evaluate performance extended across two adjoining lanes of four-lane roadways. Deposition details for the test paints were standard, in that each was applied as a set of three 4-in. wide stripes at a 15-mil wet thickness, having glass beads "dropped on" in ratio of 6 lb per gal of paints. 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 were rated ten days after application and at three-month intervals thereafter over a period of one year. Quality ratings of the test stripes 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.

Initial appearance of striping is shown in Figure 1. Vandals again damaged the stripes in both areas on US 27 (Fig. 2) as was also the case several years ago. Fortunately the tire damage was not in areas used for stripe ratings, which consequently were not affected.

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 1965 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 described qualification tests.

The "Qualification Tests" column in Table 3 and the Table 1 data show that 4 of 18 submitted whites and 5 of 9 submitted yellows failed to meet all specification requirements, and a few others were borderline. Three of the 5 disqualified yellows failed to meet the color requirement. Unfortunately, this occurred for the better performing yellow paints. By contrast, however, the four disqualified whites also had poor road performance ratings.

The Table 3 column listing the terminal service factor values of paints in the previous year's tests (1964) is given for comparison of performance of various producers' paints in two successive test years. This shows that

TABLE 2
PERFORMANCE RATING DATA
1965 TESTS

	Exposure Days	Factor Evaluated	White Paint Numbers																
			82	84	86	88	90	92	96	97	98	99	100	101	102	103	104	105	63-90
White Paints	10	General Appearance	8.8	8.7	8.7	8.7	8.5	9.0	9.1	9.5	8.4	8.7	8.8	8.6	9.4	8.5	8.5	8.9	8.7
		Durability	9.9	9.9	10.0	9.9	9.9	10.0	10.0	10.0	9.9	10.0	10.0	10.0	10.0	9.9	10.0	10.0	10.0
		Night Visibility	8.0	8.7	8.7	9.1	8.2	9.1	8.5	6.2	7.6	9.4	9.2	8.9	6.0	8.7	8.5	8.2	9.2
		Weighted Rating	8.8	9.2	9.2	9.4	8.9	9.5	9.2	8.0	8.6	9.6	9.5	9.3	7.9	9.2	9.1	9.0	9.5
	89	General Appearance	7.6	7.5	7.3	7.2	8.0	7.9	8.2	7.8	7.1	7.5	7.6	7.1	8.2	7.4	6.8	8.1	7.0
		Durability	9.0	9.3	9.3	9.2	9.3	9.2	9.3	8.9	9.3	9.3	9.3	9.3	9.3	9.3	8.7	9.5	9.4
		Night Visibility	6.1	6.4	6.3	6.5	6.3	6.4	6.3	5.6	6.1	6.4	6.3	6.6	5.2	6.3	4.8	6.5	6.7
		Weighted Rating	7.4	7.7	7.6	7.7	7.7	7.7	7.7	7.1	7.5	7.7	7.6	7.7	7.1	7.6	6.5	7.9	7.8
	184	General Appearance	5.4	5.5	5.8	5.2	5.8	5.9	6.8	4.6	5.0	5.8	6.0	5.4	5.4	5.8	3.3	6.8	5.8
		Durability	6.0	6.5	6.8	6.4	6.4	6.6	7.6	5.2	6.2	6.5	6.8	7.0	6.4	6.9	4.1	7.8	7.1
		Night Visibility	3.8	4.2	4.2	3.8	4.0	4.2	4.4	3.5	4.0	3.4	3.8	4.4	3.6	4.2	2.3	4.8	4.6
		Weighted Rating	4.8	5.3	5.4	4.9	5.1	5.3	5.9	4.2	4.9	4.8	5.2	5.5	4.9	5.4	3.1	6.2	5.7
		Service Factor	71.3	74.5	74.6	74.3	73.5	75.4	76.2	66.5	71.4	74.6	75.0	75.9	67.8	74.6	63.6	77.4	77.1
	279	General Appearance	4.6	4.8	5.1	4.7	5.3	5.2	6.3	4.2	4.4	4.6	5.1	5.2	4.7	5.0	2.9	6.6	4.8
		Durability	4.9	5.8	5.8	5.3	5.7	5.8	6.7	4.7	5.5	5.6	5.9	6.3	5.5	5.9	4.0	7.5	6.0
		Night Visibility	3.2	3.8	3.3	3.2	3.3	3.1	3.7	2.9	3.3	2.3	2.8	3.5	3.3	3.6	1.4	5.1	3.5
		Weighted Rating	4.0	4.7	4.4	4.1	4.4	4.3	5.2	3.8	4.2	3.9	4.2	4.7	4.3	4.6	2.5	6.2	4.6
	375	General Appearance	3.6	4.1	4.2	3.4	4.0	3.8	5.4	3.6	3.1	4.1	4.4	4.6	4.0	4.6	2.4	5.8	4.2
		Durability	4.0	4.9	4.9	4.4	4.4	4.4	5.8	4.1	4.6	4.9	4.8	5.8	4.8	5.4	3.2	6.5	5.4
		Night Visibility	2.8	3.3	2.6	2.5	2.8	2.4	3.6	2.7	2.5	1.8	2.4	2.7	3.0	2.7	1.0	4.1	2.9
		Weighted Rating	3.4	4.0	3.7	3.4	3.6	3.3	4.6	3.4	3.4	3.3	3.6	4.1	3.8	4.0	2.0	5.2	4.0
		Service Factor	56.2	60.3	59.6	57.7	58.4	59.2	64.0	51.9	56.6	56.7	58.8	61.7	55.4	60.4	44.3	68.3	62.1

			Yellow Paint Numbers*														
			79	81	83	85	87	89	91	95	63-101	64-85	85SA	87BC	87SA	91BF	95SA
Yellow Paints	10	General Appearance	9.2	9.0	9.5	9.4	9.5	9.3	9.2	8.7	9.3	8.9	9.4	9.6	9.5	9.0	8.8
		Durability	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
		Night Visibility	7.4	8.9	9.6	9.4	8.7	8.5	8.3	7.8	8.0	9.0	9.3	9.6	9.3	9.5	7.3
		Weighted Rating	8.6	9.4	9.8	9.6	9.3	9.2	9.1	8.8	8.9	9.4	9.6	9.8	9.6	9.7	8.5
	89	General Appearance	7.8	7.6	8.0	7.5	8.2	7.7	7.8	7.8	7.8	7.7	8.4	8.1	7.3	7.3	8.0
		Durability	9.1	9.2	9.5	9.4	9.4	9.3	9.4	9.5	9.3	9.4	9.5	9.5	9.3	9.1	9.5
		Night Visibility	5.9	6.7	7.3	6.9	6.6	6.8	6.4	6.5	6.4	6.6	7.8	6.8	6.5	6.9	5.9
		Weighted Rating	7.4	7.8	8.2	8.0	7.9	7.9	7.7	7.8	7.7	7.8	8.5	8.0	7.7	7.8	7.6
	184	General Appearance	5.0	5.6	5.5	6.1	5.8	5.5	5.0	5.9	5.2	5.9	6.9	6.7	6.0	4.9	6.2
		Durability	5.8	5.9	6.8	7.2	7.2	6.6	6.4	7.4	6.1	7.2	7.7	7.7	6.9	5.6	8.1
		Night Visibility	3.8	4.2	4.8	4.3	4.1	4.3	4.0	4.3	4.0	4.3	6.0	4.9	4.2	2.6	3.8
		Weighted Rating	4.7	5.0	5.7	5.6	5.5	5.3	5.1	5.7	5.0	5.6	6.7	6.2	5.5	4.0	5.8
		Service Factor	70.2	74.9	79.9	78.1	76.5	74.7	74.0	70.5	73.3	76.7	83.7	80.1	76.3	73.3	73.5
	279	General Appearance	4.5	4.8	5.6	5.5	4.9	5.0	4.7	5.7	4.6	4.7	6.0	6.1	5.3	3.5	5.3
		Durability	5.2	5.2	5.9	6.0	5.8	5.4	5.7	6.7	5.4	5.8	7.3	7.3	6.1	3.9	6.8
		Night Visibility	3.2	3.3	3.5	3.2	3.7	3.3	3.7	4.0	2.8	3.8	5.3	3.7	5.0	2.0	3.8
		Weighted Rating	4.1	4.2	4.6	4.5	4.6	4.3	4.6	5.3	4.0	4.6	6.1	5.4	4.9	2.9	5.2
	375	General Appearance	3.8	4.4	5.0	5.2	4.7	4.3	4.3	4.6	4.1	4.8	5.8	5.4	4.8	3.4	5.0
		Durability	4.4	4.8	5.1	5.4	5.3	4.8	5.0	5.7	4.6	5.8	7.0	6.5	6.0	3.5	5.8
		Night Visibility	2.8	3.1	3.4	3.0	3.4	3.0	3.1	3.2	2.8	3.5	5.2	3.1	4.5	1.6	3.1
		Weighted Rating	3.5	3.9	4.2	4.1	4.2	3.9	4.0	4.3	3.6	4.5	6.0	4.6	5.1	2.5	4.3
		Service Factor	55.5	58.8	63.7	62.4	61.9	59.4	59.6	60.7	57.2	62.5	73.0	66.9	63.6	51.7	62.1

*Experimental Stripes:
SA: Silicone Additive (DC 21 PA) in Paints 85 (2 areas), 87 (1 area), and 95 (1 area).
BF: Flex-O-Lite Glass Beads (Safe-Ray) in Paint 91 (2 areas).
BC: Cataphote Glass Beads (Hi-Glo) in Paint 87 (2 areas).
64-85: 64 PR-85 (4 areas).

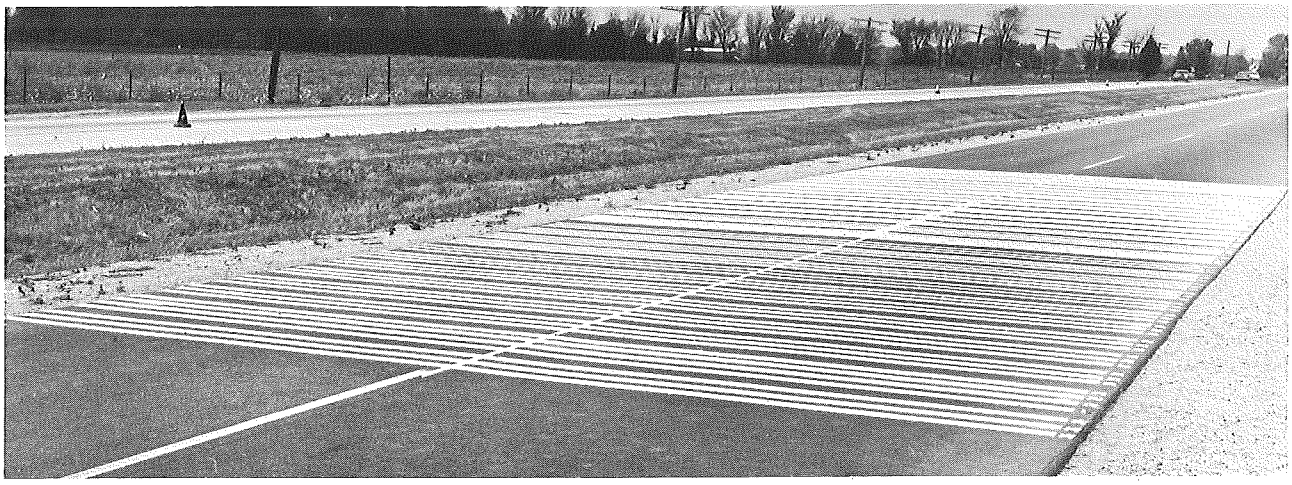

Figure 2 (above). Initial appearance of performance stripes in Test Area 4 (bituminous) on northbound US 27 south of St. Johns, with yellows in foreground and whites in background.

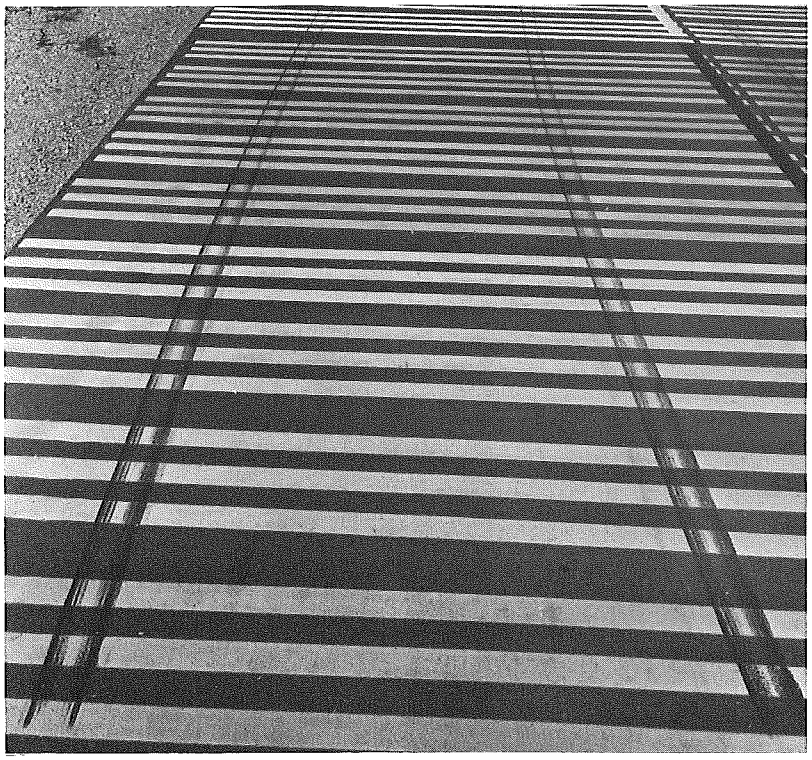

Figure 3 (right). Appearance of stripes in Test Area 4 (bituminous) three weeks after application, showing damage caused by several passages of a hot-rod car. Fortunately, damage was generally not in spots used for ratings. Foreground shows yellow stripes in passing lane.

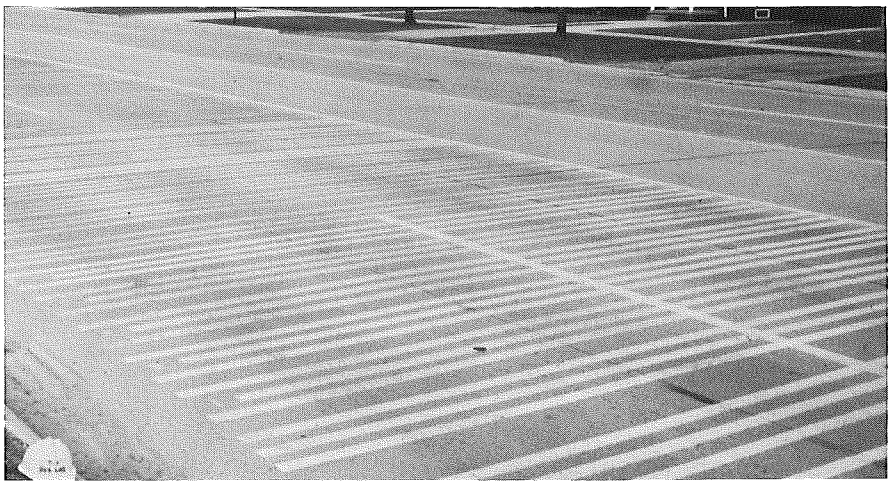

Figure 4 (left). Condition of Wayne County stripes on concrete of Beech-Daly Road after over seven months of service (termination of tests). Helmet identifies MDSH white control paint. Extra paints were Wayne experimentals.

the 1965 whites rated about the same as those in 1964, while the yellows rated slightly better--about 1 point on average. It should be remembered, however, that the 1964 paints rated about 8 points lower, on average, than their 1963 counterparts. As before, the current tests included sample stripes of the white and yellow paints purchased for the Department's 1965 roadway striping, for information on reproducibility of ratings and for a check on analytical methods employed in acceptance testing. For the first time in the last 6 to 7 years, the comparison is not good, especially for the yellow paints. A mistake in striping of Area 3C may have contributed to the relatively poor showing of the yellow, but this will bear scrutiny in current and future tests.

Since each producer submitted two white paints for the 1965 tests, Table 3 has an additional column permitting comparison of the road performance of each producer's two samples. It is noted that the spread is somewhat larger than at the half-year level, as presented to the Committee in Research Report No. R-577.

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

Experimental Paint and Beads

No special or experimental paints, nor any from Detroit area, were evaluated in this year's tests. However, field testing for information was conducted on two products, as mentioned earlier:

1. A special paint additive (64 PR-91), to note its effect on improvement of durability, evaluated in three yellow paints in one or two areas each. The additive appears to give some improvement, as it did in last year's tests.

2. Special high-intensity colorless beads supplied by two producers (65 MR-40 and -80). The results are inconsistent in that one shows an improvement and the other a decrease of rating.

Cooperative Tests with Wayne County and with Detroit

In accordance with previous arrangements, and as in the past, the Department cooperated with Wayne County and with the City of Detroit in their performance striping.

TABLE 3
SERVICE FACTORS AND TERMINAL RATINGS
1965 PERFORMANCE PAINTS*

	Paint No.	1964 Service Factor (376 Days)	1965 Service Factors		Terminal Percent of Best	Qualification Tests	Producer Code
			184 Days	375 Days			
White Paints	105	62.0	77.4	68.3	100.0	Passed	A
	96	62.0	76.2	64.0	93.8	Passed	A
	101	58.1	75.9	61.7	90.3	Passed	B
	103	59.2	74.6	60.4	88.5	Passed	C
	84	--	74.5	60.3	88.3	Passed	D
	86	61.6	74.6	59.6	87.3	Passed**	E
	92	59.2	75.4	59.2	86.6	Passed	C
	100	61.6	75.0	58.8	86.1	Passed**	E
	90	52.4	73.5	58.4	85.6	Passed	F
	88	58.1	74.3	57.7	84.4	Passed	B
	99	--	74.6	56.7	83.1	Passed	D
	98	57.8	71.4	56.6	82.8	Passed	G
	82	57.8	71.3	56.2	82.2	Passed	G
	102	52.4	67.8	55.4	81.0	Passed	F
	97	--	66.5	51.9	76.0	Failed	H
	104	53.5	63.6	44.3	64.8	Failed	I
	63-90(a)	68.3(b)	77.1	62.1	90.9		
Yellow Paints	83	--	79.9	63.7	100.0	Failed	
	85	63.1	78.1	62.4	98.0	Passed**	
	87	58.0	76.5	61.9	97.2	Passed	
	95	61.5	70.5	60.7	95.4	Failed	
	91	65.3	74.0	59.6	93.5	Failed	
	89	53.6	74.7	59.4	93.2	Passed	
	81	53.8	74.9	58.8	92.4	Passed	
	79	--	70.2	55.5	87.1	Failed	
	64-85	--	76.7	62.5	98.2		
	63-101(a)	71.8(b)	73.3	57.2	89.3		
	85SA(c)	--	83.7	73.0	114.6		
	87SA(c)	--	76.3	63.6	99.9		
	95SA(c)	--	73.5	62.1	97.5		
	87BC(d)	--	80.1	66.9	105.2		
	91BF(d)	--	73.3	51.7	81.3		

a) Paints purchased for 1965 roadway striping.
b) Values obtained in 1963 tests, using same areas as in 1964.
c) Special additive to paints, same as in 1964 experiment:
85SA (2 test areas), 87SA (1 test area), 95SA (1 test area).
d) Special high-intensity colorless beads:
87BC - HiGlo beads in Paint 87 (2 test areas).
91BF - Safe-Ray beads in Paint 91 (2 test areas).

*All paints applied at rate of 16.5 gal per mile of 4-in. stripe; 6 lb of MDSH Type 3 beads dropped on per gallon, except on some experimental stripes, as noted. Two field areas different than in 1964 tests.

**Paints furnished with beads by manufacturer. All other entries for paints only.

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 terminal level of 7 months. The samples included 12 whites and 12 yellows applied as triplicate, beaded stripes, in two test areas--concrete on Beech-Daly Road and bituminous on Schoolcraft Road. These were applied on August 24 and September 2, 1965, respectively. Highway Department control paints were applied on Beech-Daly. Performance of the paints was normal on Beech-Daly (Fig. 4), but again poorer than expected on the Schoolcraft bituminous. The State control paints rated about equal to the second or third best paints on Beech-Daly.

For Detroit, participation consisted of assistance on July 15, 1965 in application of 11 whites and 10 yellows on the bituminous surface of Oakland Avenue. When rated after 8-1/2 months of service, only one white and one yellow rated 5 or better. The Department's white control was rated as -4 and the yellow as 6 in durability. From the standpoint of durability, the stripes rated poorer than normal, although slightly better than last year.