

1957 TRAFFIC PAINT PERFORMANCE TEST  
Oakland Avenue, Detroit

A. J. Permoda  
Wm. Martin  
M. H. Janson

Research Laboratory Division  
Office of Testing and Research  
Report No. 299  
Research Project 47 G-36 (10)  
Progress Report 3 (Final)

LAST COPY  
DO NOT REMOVE FROM LIBRARY

Michigan State Highway Department  
John C. Mackie, Commissioner  
Lansing, November 1958

1957 TRAFFIC PAINT PERFORMANCE TEST  
Oakland Avenue, Detroit

This report presents information on the performance of traffic paints deposited as both beaded and unbeaded transverse stripes on sheet asphalt surfacing of a roadway test area in Detroit. The paints used included all those in the Department's 1957 performance tests plus a white paint and a yellow paint supplied by the City of Detroit.

The purpose of the test was twofold: (1) to provide information on whether the traffic paints would have the same comparative ratings in Detroit's urban environment as in the rural environment of the Department's standard test sites; and (2) to provide service life ratings in the metropolitan area for both unbeaded stripes as customarily used by the City of Detroit and reflectorized stripes as used by the Highway Department.

DEPOSITION DETAILS

Deposition details for paint stripes in the Detroit tests were given in Research Laboratory Division Report 282, the first progress report on Highway Research Project 47 G-36 (10).

In summary, all the traffic paints were deposited at a 15-mil wet stripe thickness, the same thickness used in the standard MSHD test areas. Each paint was applied as one series of four adjacent transverse

stripes, with two stripes beaded and two unbeaded. The stripes were bead-reflectORIZED by the "drop-in" method currently used by the Department, in the ratio of six pounds of beads per gallon of paint. The traffic paints were deposited on sheet asphalt surfacing, standard for Detroit, in that city's performance test area on Oakland Avenue. This operation was performed September 5, 1957, by Research Laboratory Division personnel, with the Detroit Department of Streets and Traffic controlling traffic.

#### QUALIFICATION TESTS

Results of qualification tests on the paints used in the Department's 1957 performance tests are listed in Table 1 of Research Laboratory Division Report 298, the second on this project. This table shows that one white and five yellow paints did not meet all qualification test requirements.

The two paints supplied by Detroit for the field tests were not brought into the Laboratory for qualification tests.

#### FIELD PERFORMANCE RATINGS

The Detroit stripes were rated by three or four observers four days after deposition and at intervals of about six weeks thereafter for a period of one year. Evaluation of service on both the beaded and unbeaded test stripes was based on appearance, durability, and night visibility, as is done in standard highway performance areas, with the weighting rating and service factor values calculated in the customary manner.

The averaged quality values and the weighted rating values for the individual paints are tabulated from all field observations in Table 2 of this report. This table also lists the terminal service factor values for both the beaded and unbeaded paint stripes.

#### RESULTS OF FIELD PERFORMANCE TESTS

The performance records of all the Detroit test stripes are presented graphically in Figures 1 and 2; one curve on each plate represents the performance of beaded striping while a second curve represents the unbeaded stripes of the same paint.

These graphs indicate a longer service life for beaded than for unbeaded stripes of each paint. An exact numerical value for this difference may be obtained from the graphs if a weighted rating value is set at which traffic lines should be re-striped. It has been assumed here that traffic lines should be repainted when the striping degrades to a weighted rating value of 3; this stage is denoted on the graphs by a heavy horizontal line. The service life of the individual traffic paints, then, is the point at which the curve crosses this line. These service life-span values are tabulated in Table 1 for both the beaded and the unbeaded stripes of all paints, listed according to a descending order of terminal service factors as calculated for the beaded stripes in the Detroit tests.

A center column of Table 1 lists the ratio of beaded to unbeaded service life for each paint, and shows that addition of glass beads in-

creased test stripe life by an average factor of 2.5 for the whites and 2.7 for the yellows. These values also show that glass bead addition increased service life for the better-rated paints by a higher factor than for the poorer paints.

The last three columns of Table 1 rank the paints from best to poorest on the basis of terminal service factors for beaded and unbeaded stripes in Detroit and for beaded stripes at the MSHD 1957 rural test sites. A comparison of these data columns shows different orders of rating, indicating that both glass-bead reflectorization and exposure environment affected the comparative ratings.

The data in the last two columns of Table 1 are also presented in Figure 3. One curve in each plate plots one-year, terminal service factors for each paint in the 1957 rural performance tests, while the second curve is for the corresponding Detroit beaded stripes. In neither figure are the curves parallel, indicating that relative performance differed in the rural and urban areas.

The graphs also show only a slightly faster average degradation rate (lower service factor) for beaded paints exposed to 23,000 vehicles daily in Detroit, than for those in rural areas having half the city's average traffic density.

## CONCLUSIONS

Paint performance tests conducted on a Detroit street and on rural highways in 1957 showed that:

1. Individual paints, as beaded stripes, generally did not have the same relative ratings in the rural test areas as in Detroit. Relative ratings were similar for about 60 percent of the test paints, but differed by significant amounts for the remainder.
2. Individual paints, as beaded stripes, generally displayed only a slightly faster degradation rate in Detroit than on rural highways, although traffic density was twice as high in Detroit.
3. Not all individual paints tested in Detroit had the same relative ratings for unbeaded and beaded stripes, although the poorer paints tended to do so.
4. In Detroit, glass-bead reflectorized stripes had an average service life 2.5 times longer than unbeaded stripes of the same paint. The increase in service life due to reflectorization was greater for the better-rated paints than for the poorer ones.

It may be deduced from basic statistics that performance data plotted in Figures 1 and 2 would have produced smoother, more reliable curves, had several test areas been used in Detroit rather than a single one.

TABLE 1  
 TERMINAL RATINGS  
 1957 Detroit Transverse Stripes

Identification Number*	Service Life Span, days**		Service Life Ratio: $\frac{\text{Beaded}}{\text{Unbeaded}}$	Terminal Service Factor Rank		
	Unbeaded	Beaded		Detroit		MSHD Rural
				Unbeaded 8 mo	Beaded 1 yr	Beaded 1 yr
<b>White Paints</b>						
Det. (a)	125	435	3.5	(1)	(1)	- - - (b)
106	118	376	3.1	3	1	6
90	100	332	3.3	6	2	5
100	124	300	2.4	1	3	3
96	114	292	2.6	2	4	10
92	100	305	3.1	5	5	1
102	100	317	3.2	4	6	4
98	98	182	1.9	7	7	2
110	92	170	1.8	8	8	7
94	91	133	1.5	9	9	11
104	88	146	1.7	11	10	9
108	89	135	1.5	10	11	8
Average	103	260	2.5			
<b>Yellow Paints</b>						
89	115	480	4.2	3	1	2
97	110	410	3.7	4	2	1
Det. (c)	117	420	3.6	(3)	(2)	- - - (b)
105	107	400	3.8	5	3	3
101	128	460	3.6	1	4	4
95	125	350	2.8	2	5	9
109	92	178	1.9	8	6	6
107	100	172	1.7	6	7	5
99	102	166	1.6	7	8	8
91	89	153	1.7	9	9	7
93	90	125	1.4	10	10	10
103	77	97	1.3	11	11	11
Average	104	284	2.7			

\* Same as in standard MSHD Performance Tests (Reports 282, 298).

\*\* Age intercept when Weighted Rating equals 3 (Figs 1 and 2).

(a) Supplied for this test by producer furnishing white paint for Detroit's 1957 striping.

(b) Not included in MSHD rural performance tests.

(c) Used by Detroit in 1957; made by same producer furnishing Paint No. 89 for MSHD tests.

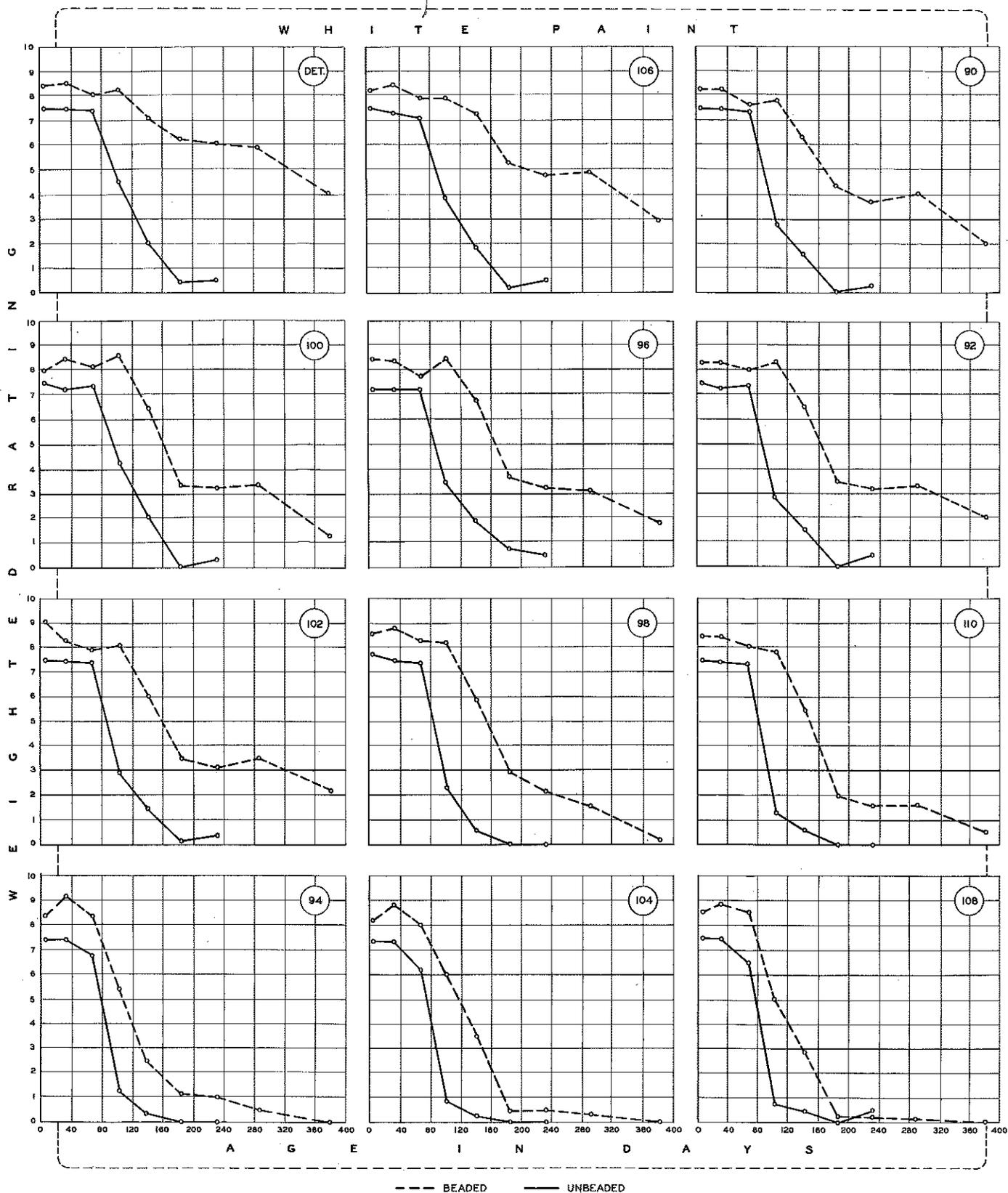


Figure 1. Weighted Ratings of White Traffic Paints in Detroit Stripes.  
 (WR value of 3, as datum, yields service life span)

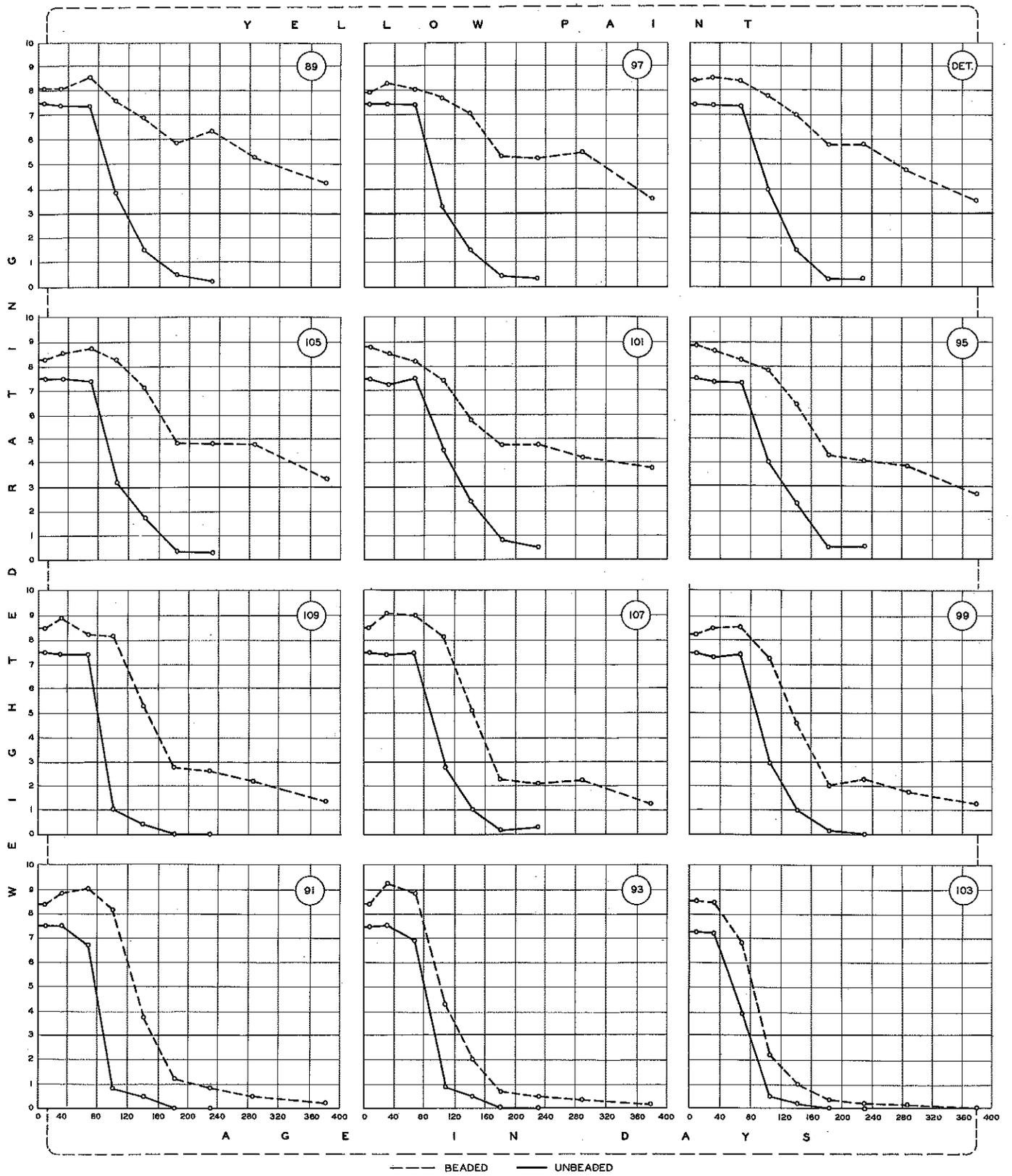


Figure 2. Weighted Ratings of Yellow Traffic Paints in Detroit Stripes.  
(WR value of 3, as datum, yields service life span)

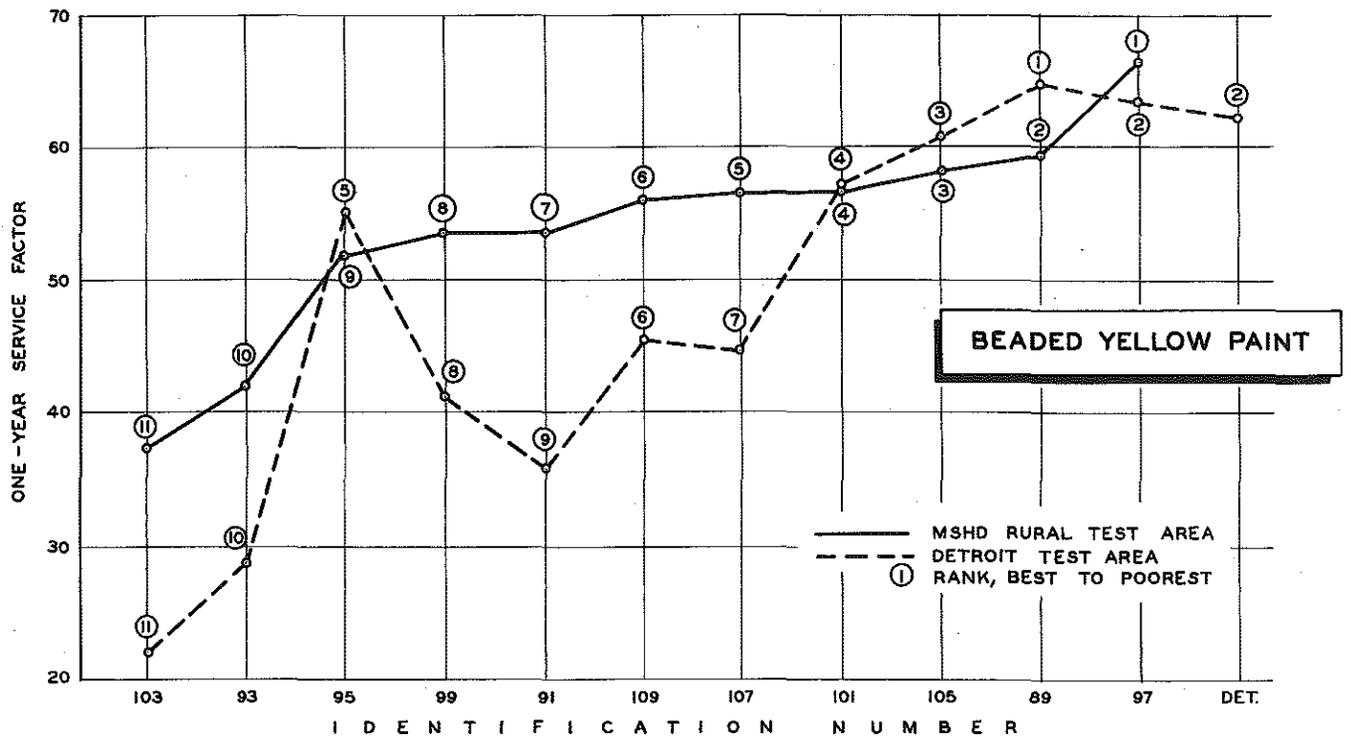
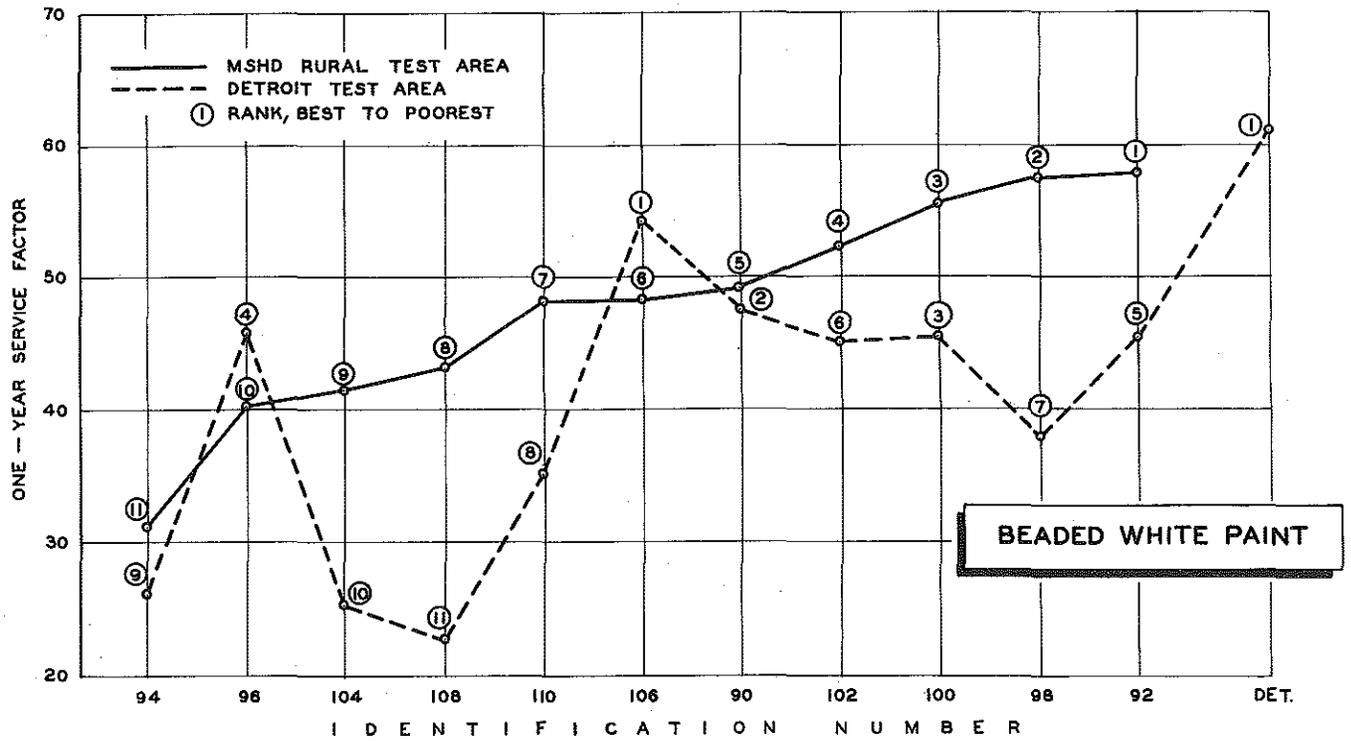


Figure 3. One-Year Service Factors. Performance Tests in MSHD Rural Test Areas and in Detroit.

TABLE 2

DETROIT PERFORMANCE DATA  
1957 Transverse Stripes

Traffic Count = 23,000 Vehicles/24 hours

W H I T E P A I N T S

Exposure Days	Factor Evaluated	Unbeaded												Beaded											
		90	92	94	96	98	100	102	104	106	108	110	Detroit	90	92	94	96	98	100	102	104	106	108	110	Detroit
4	General Appearance	10.0	10.0	9.7	8.0	10.0	9.0	10.0	8.7	9.7	10.0	10.0	10.0	7.7	8.0	8.7	6.3	8.0	8.0	7.0	8.0	8.3	8.7	7.7	8.0
	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	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Night Visibility	5.0	5.0	5.0	5.0	5.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	7.0	6.7	7.0	7.7	7.7	6.3	8.7	6.7	6.7	7.3	7.3	7.0
	Weighted Rating	7.5	7.5	7.5	7.3	7.7	7.4	7.5	7.4	7.5	7.5	7.5	7.5	8.3	8.2	8.4	8.5	8.7	8.0	9.1	8.2	8.2	8.5	8.4	8.3
32	General Appearance	9.3	8.7	9.7	8.3	10.0	7.7	9.7	8.3	8.7	10.0	9.7	10.0	6.3	6.3	6.7	5.3	6.7	5.7	6.0	6.7	6.7	7.0	6.0	7.0
	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	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Night Visibility	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	7.3	7.3	9.0	7.7	8.3	7.7	7.3	8.3	7.7	8.3	7.7	7.7
	Weighted Rating	7.4	7.4	7.5	7.3	7.5	7.3	7.5	7.3	7.4	7.5	7.5	7.5	8.3	8.3	9.2	8.4	8.8	8.4	8.3	8.8	8.5	8.9	8.5	8.6
68	General Appearance	9.0	9.0	6.0	8.0	9.0	9.0	9.0	6.0	8.3	7.7	8.7	9.3	6.0	6.3	5.7	4.7	6.0	5.7	5.3	6.0	6.3	7.0	6.3	7.0
	Durability	10.0	10.0	9.0	10.0	10.0	10.0	10.0	8.0	9.7	8.0	10.0	10.0	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	10.0
	Night Visibility	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.7	4.7	5.0	5.0	5.0	6.3	7.0	7.7	6.7	7.7	7.3	7.0	7.0	6.7	7.7	7.0	6.7
	Weighted Rating	7.4	7.4	6.7	7.3	7.4	7.4	7.4	6.2	7.1	6.5	7.4	7.4	7.6	8.0	8.3	7.7	8.3	8.1	7.9	8.0	7.9	8.4	8.0	8.1
102	General Appearance	3.7	4.0	2.0	4.3	3.3	5.0	3.3	1.0	4.3	1.7	2.3	5.0	7.0	7.3	5.3	6.0	6.7	7.0	6.0	5.0	6.7	5.0	7.0	7.7
	Durability	3.7	3.7	1.7	4.3	3.0	5.3	3.7	1.0	4.7	1.3	2.0	5.7	9.0	9.0	6.3	9.0	9.3	9.0	9.0	6.7	8.3	5.0	9.0	9.0
	Night Visibility	1.7	2.0	0.7	2.7	1.7	3.3	2.0	0.7	3.0	0.3	0.7	3.7	7.0	8.0	4.7	8.7	7.7	8.7	7.7	5.7	7.7	5.0	7.0	7.7
	Weighted Rating	2.7	2.9	1.2	3.5	2.4	4.3	2.8	0.9	3.8	0.8	1.4	4.6	7.8	8.3	5.4	8.6	8.2	8.7	8.1	6.0	7.8	5.0	7.8	8.2
140	General Appearance	2.7	2.7	0.3	3.3	1.3	3.0	2.0	0.7	2.7	1.0	1.0	3.3	6.7	6.7	3.3	6.3	6.3	7.0	6.3	3.7	7.3	4.0	5.7	7.7
	Durability	2.3	2.0	0.7	2.7	1.3	3.0	2.3	0.5	2.3	1.0	1.3	2.7	8.0	8.0	3.0	7.7	6.7	7.3	7.7	3.7	8.0	3.3	6.0	8.0
	Night Visibility	0.7	0.7	0.0	1.0	0.0	1.0	1.0	0.0	1.3	0.0	0.0	1.3	5.0	5.3	2.0	6.0	5.0	5.7	4.7	3.3	6.7	2.0	4.7	6.3
	Weighted Rating	1.5	1.4	0.3	1.9	0.7	2.0	1.6	0.3	1.8	0.5	0.6	2.1	6.4	6.5	2.5	6.7	5.8	6.5	6.1	3.5	7.3	2.7	5.3	7.1
183	General Appearance	0.0	0.0	0.0	1.3	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.3	4.7	4.3	1.3	4.0	2.7	3.7	3.7	1.0	5.0	0.0	2.7	7.0
	Durability	0.0	0.0	0.0	1.3	0.0	0.0	0.3	0.0	0.7	0.0	0.0	0.7	5.5	4.5	1.3	4.8	3.7	4.7	4.8	1.0	5.7	0.3	3.0	7.8
	Night Visibility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	2.7	1.0	2.7	2.3	2.3	2.3	0.0	5.0	0.0	1.0	5.0
	Weighted Rating	0.0	0.0	0.0	0.7	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.3	4.3	3.6	1.2	3.7	2.9	3.4	3.4	0.5	5.3	0.1	2.0	6.3
233	Service Factor	43.3	43.3	36.3	45.9	40.9	47.0	43.9	34.1	45.7	35.6	38.6	48.7												
	General Appearance													3.7	3.3	1.0	4.0	2.3	3.3	3.0	1.0	5.0	0.3	1.7	7.0
	Durability													4.0	3.2	1.0	4.2	2.2	3.7	3.3	1.0	6.3	0.2	1.8	7.2
	Night Visibility													3.5	3.0	1.0	2.5	2.0	3.0	3.0	0.0	3.3	0.0	1.5	5.0
284	Weighted Rating													3.7	3.1	1.0	3.3	2.1	3.3	3.1	0.5	4.7	0.2	1.6	6.1
	General Appearance													4.7	4.0	1.0	4.0	2.3	3.7	4.0	0.7	6.3	0.3	2.3	7.0
	Durability													4.3	3.7	1.0	4.3	2.3	4.7	4.3	0.7	6.3	0.3	2.0	7.0
	Night Visibility													3.7	2.7	0.0	2.0	1.0	2.3	2.7	0.0	3.3	0.0	1.3	4.7
378	Weighted Rating													4.0	3.2	0.5	3.1	1.7	3.4	3.5	0.4	4.8	0.2	1.7	5.9
	General Appearance													3.0	2.7	0.0	2.7	0.7	2.3	2.3	0.0	4.0	0.0	1.0	5.7
	Durability													2.0	2.3	0.0	2.2	0.3	2.0	2.2	0.0	3.3	0.0	0.5	5.0
	Night Visibility													1.8	1.7	0.0	1.3	0.0	1.5	2.0	0.0	2.5	0.0	0.5	3.0
378	Weighted Rating													2.0	2.0	0.0	1.8	0.2	1.8	2.1	0.0	3.0	0.0	0.6	4.1
	Service Factor													52.8	50.6	31.1	50.8	43.2	50.9	50.4	30.2	59.4	27.8	40.3	66.3

TABLE 2 (Continued)

DETROIT PERFORMANCE DATA  
1957 Transverse Stripes

Traffic Count = 23,000 Vehicles/24 hours

Y E L L O W P A I N T S

Exposure Days	Factor Evaluated	Unbeaded												Beaded											
		89	91	93	95	97	99	101	103	105	107	109	Detroit	89	91	93	95	97	99	101	103	105	107	109	Detroit
4	General Appearance	9.7	10.0	9.7	10.0	10.0	9.3	10.0	8.0	10.0	10.0	10.0	9.7	8.0	9.0	9.0	8.3	8.3	8.3	8.3	7.7	8.3	8.7	8.7	8.0
	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	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Night Visibility	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.7	7.0	7.0	8.0	7.3	6.7	8.0	7.7	7.0	7.3	7.3	7.3
	Weighted Rating	7.5	7.5	7.5	7.5	7.5	7.4	7.5	7.3	7.5	7.5	7.5	7.5	8.2	8.4	8.4	8.8	8.5	8.2	8.8	8.6	8.3	8.5	8.5	8.5
32	General Appearance	9.0	10.0	10.0	8.7	9.7	8.0	8.0	7.0	10.0	9.7	9.0	9.0	6.7	7.3	7.0	6.0	7.3	6.3	6.0	5.3	7.7	7.7	7.3	6.7
	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	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Night Visibility	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	7.0	8.3	9.0	8.0	8.3	7.7	8.0	8.0	7.7	8.7	8.3	7.7
	Weighted Rating	7.4	7.5	7.5	7.4	7.5	7.3	7.3	7.2	7.5	7.5	7.4	7.4	8.2	8.9	9.2	8.6	8.9	8.5	8.6	8.5	8.6	9.1	8.9	8.5
68	General Appearance	9.3	8.3	7.7	9.0	9.0	9.3	9.3	4.3	9.3	10.0	9.0	9.3	6.7	7.0	6.3	6.3	6.7	7.0	6.7	6.0	7.0	8.0	7.0	7.0
	Durability	10.0	8.7	9.0	10.0	10.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
	Night Visibility	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	8.0	9.0	8.7	7.7	8.0	8.0	7.3	5.3	8.3	8.7	7.3	7.7
	Weighted Rating	7.4	6.8	6.9	7.4	7.4	7.4	7.4	3.9	7.4	7.5	7.4	7.4	8.6	9.1	8.9	8.4	8.6	8.6	8.2	6.7	8.7	9.0	8.2	8.4
102	General Appearance	5.7	1.3	1.3	5.7	4.7	3.7	5.7	0.7	5.0	3.7	1.7	5.7	6.3	7.3	5.0	7.0	7.3	6.7	7.0	2.3	8.3	8.7	7.0	6.7
	Durability	5.3	1.0	1.0	5.3	4.3	3.3	5.7	0.7	4.3	3.3	1.3	5.7	8.3	8.7	4.7	8.7	8.7	7.7	8.0	2.3	9.0	9.0	9.0	8.7
	Night Visibility	2.3	0.7	0.7	2.7	2.3	2.3	3.3	0.3	2.0	2.0	0.7	2.3	7.3	8.0	4.0	7.3	7.0	7.0	7.0	2.3	7.7	7.3	7.7	7.3
	Weighted Rating	3.8	0.9	0.9	4.0	3.3	2.8	4.5	0.5	3.2	2.7	1.0	4.0	7.6	8.2	4.4	7.8	7.7	7.3	7.4	2.3	8.3	8.1	8.2	7.8
140	General Appearance	2.7	1.0	1.0	3.3	3.0	1.7	4.0	0.7	2.7	2.0	1.0	2.7	6.3	4.0	3.0	6.7	7.3	4.7	6.0	2.0	6.0	7.0	6.3	6.7
	Durability	2.7	0.8	0.8	3.7	2.3	1.7	3.7	0.3	2.7	1.7	0.8	2.7	8.3	4.3	2.7	7.3	8.3	5.3	6.3	1.3	8.0	5.7	6.7	8.0
	Night Visibility	0.3	0.0	0.0	1.0	0.7	0.3	1.0	0.0	0.7	0.3	0.0	0.3	6.0	3.3	1.3	5.7	6.0	4.0	5.3	0.7	6.7	4.3	4.0	6.3
	Weighted Rating	1.5	0.4	0.4	2.3	1.6	1.0	2.4	0.2	1.7	1.0	0.4	1.5	7.0	3.8	2.0	6.4	7.1	4.6	5.8	1.1	7.2	5.1	5.3	7.0
183	General Appearance	0.7	0.0	0.0	1.0	0.7	0.3	1.7	0.0	0.7	0.3	0.0	0.7	5.7	1.3	1.0	4.3	5.3	2.3	4.0	0.3	5.3	3.0	2.7	6.0
	Durability	1.0	0.0	0.0	1.0	1.0	0.3	1.7	0.0	0.7	0.3	0.0	0.7	7.3	1.7	1.0	4.5	5.8	2.3	5.3	0.7	5.3	2.8	3.2	6.7
	Night Visibility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	1.0	0.3	4.3	5.0	1.7	4.3	0.0	4.3	1.7	2.3	5.0
	Weighted Rating	0.5	0.0	0.0	0.5	0.5	0.2	0.9	0.0	0.4	0.2	0.0	0.4	5.8	1.3	0.7	4.4	5.4	2.0	4.7	0.3	4.8	2.3	2.7	5.8
233	General Appearance	0.7	0.0	0.0	1.0	0.7	0.0	1.3	0.0	0.7	0.7	0.0	0.7	6.7	1.0	1.0	5.0	5.7	3.0	5.0	0.0	6.3	2.7	3.7	7.0
	Durability	0.7	0.0	0.0	1.0	0.7	0.0	1.0	0.0	0.7	0.7	0.0	0.7	7.3	1.3	1.0	5.2	6.0	3.0	6.0	0.3	6.0	3.3	3.7	7.0
	Night Visibility	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.5	0.0	3.0	4.5	1.5	3.5	0.0	3.5	1.0	1.5	4.5
	Weighted Rating	0.4	0.0	0.0	0.5	0.4	0.0	0.5	0.0	0.4	0.4	0.0	0.4	6.3	0.9	0.5	4.1	5.2	2.3	4.7	0.1	4.8	2.1	2.6	5.8
Service Factor	37.0	28.5	28.5	38.8	36.4	33.4	40.4	22.4	36.3	34.0	29.4	37.0													
284	General Appearance													6.7	1.0	1.0	5.7	6.7	3.0	5.0	0.3	6.7	2.3	2.3	6.7
	Durability													7.0	1.0	0.7	5.3	6.7	2.3	5.7	0.3	6.3	2.7	2.7	6.7
	Night Visibility													3.7	0.0	0.0	2.3	4.3	1.0	3.0	0.0	3.3	1.7	1.7	2.7
	Weighted Rating													5.3	0.5	0.4	3.8	5.5	1.7	4.3	0.2	4.8	2.2	2.2	4.7
378	General Appearance													5.7	0.7	0.3	3.7	5.3	2.0	4.0	0.0	4.7	2.3	2.0	5.3
	Durability													6.3	0.3	0.2	3.5	4.7	1.8	4.8	0.0	4.7	2.0	2.2	4.8
	Night Visibility													2.3	0.0	0.0	1.8	2.5	0.7	2.8	0.0	2.0	0.5	0.7	2.2
	Weighted Rating													4.2	0.2	0.1	2.7	3.7	1.3	3.7	0.0	3.4	1.3	1.4	3.6
Service Factor													64.6	35.8	28.8	55.1	63.1	41.2	57.1	21.8	60.6	44.8	45.4	62.3	