

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
JOHN C. MACKIE, COMMISSIONER

1956

PERFORMANCE TESTS  
ON WHITE AND YELLOW TRAFFIC PAINT

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

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Progress Report 2

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## 1956 PERFORMANCE TESTS OF WHITE AND YELLOW TRAFFIC PAINT

Twenty-four paints were put down in the 1956 tests, one white and one yellow from each of eleven producers, plus one State of California composition specification white traffic paint, and one yellow experimental paint formulated by the Research Laboratory. The sources of the test paints were;

1. Baltimore Paint and Color Works, Baltimore
2. Buckeye Paint and Varnish Company, Toledo
3. Cook Paint and Varnish Company, Detroit
4. Franklin Paint Company, Franklin, Massachusetts
5. Glidden Company, Cleveland
6. Jaegle Paint and Varnish Company, Philadelphia
7. L.K.R. Chemical Company, Detroit
8. Minnesota Mining and Manufacturing Company, St. Paul
9. Patterson-Sargent Company (BPS), Cleveland
10. Prismo Safety Corporation, Huntingdon, Pennsylvania
11. Truscon Laboratories, Detroit
12. California Division of Highways, White, Type IV Specification; MSHD No. 12A Yellow Experimental Traffic Paint.

Deposition particulars covering white and yellow traffic paints applied August 15-22, 1956, were presented in Research Laboratory Report 267, the first progress report on this project.

### QUALIFICATION TESTS

Paints were tested for conformance with specification requirements in color, reflectivity, consistency, bleeding, and settling; test results are presented in Table 1. The following paints failed to meet one or more of the requirements:

#### White Paints

- No. 93 Low reflectivity, bleeding on tar
- No. 100 Low settling index
- No. 110 Excessive field drying time
- No. 112 Low reflectivity, contained about 2.7 lbs glass spheres per gallon as pigment in paint
- No. 114 Excessive bleeding on tar
- No. 120 Experimental paint, contained about 6.0 lbs. glass spheres per gallon of unbeaded paint.

## Yellow Paints

- No. 103 Low viscosity
- No. 107 Mustard color of low reflectivity
- No. 111 Excessive field drying time
- No. 113 Paint contained about 2.7 lbs. glass spheres  
per gallon of paint as pigment component
- No. 119 Low viscosity, excessive bleeding on asphalt, low settling  
index, green color
- No. 121 Excessive field drying time.

An interim letter report dated April 29, 1957, listing qualification test results, was issued to the committee prior to its Spring meeting. Manufacturers of paints not meeting specification requirements were to be notified of their respective paints' shortcomings when requisitions were submitted to them for 1957 performance paints.

### FIELD PERFORMANCE RATINGS

Test stripes were rated in all four test areas two weeks after deposition, and at three-month intervals thereafter for one year after deposition. Ratings, averaged from the four test areas, are presented for all test paints in Table 3. The average quality values for the individual paints were used in calculating the respective weighted ratings, which are recorded both in tabular form (Table 3) and in graphic form (Figure 2) for the duration of the performance tests.

Variation in the durabilities of the same paints which may result from exposure in two different areas, is demonstrated in Figure 1. The two photos were taken at the conclusion of 1956 testing.

In an attempt to show graphically how effectively paint durability is translated into night visibility, data is assembled in Figure 3 on the three best-rated white paints. The "weighted rating" values are graphed against stripe age, along with the respective "durability" and "night visibility" ratings. The vertical distance between durability and night visibility values of each paint demonstrates how effectively the remaining paint (Durability) is reflectorized to yield night visibility. The smaller this distance, the greater is the efficiency with which paint durability is translated into night visibility.

In this respect, Experimental Paint No. 120, with 6 lbs. of premixed and 2 lbs. of overlay MSHD Type 3 beads per gallon, excelled the other two paints, both of which had 6 lbs. of Type 3 beads dropped-on per gallon.

## RESULTS OF FIELD PERFORMANCE TESTS

Table 2 contains a summary of final evaluation values for all 1956 test points, listed in descending order of "Percent of Best" values. Half-year and one-year service factor values (identical to former "Percent of Perfect" values), for all test stripes are tabulated in Table 2, which also contains a column summarizing the previously mentioned Qualification Tests.

The "Qualification Tests" column in Table 2 shows that six of the white paints (50 percent of samples) and four of the yellow paints (33 percent of samples) failed to meet all specification requirements. In the whites, this represents an undesirable increase over last year, when only 30 percent failed.

Locations of the test points at the four sites are shown in Figure 4. Two standard test areas on US-27 southwest of Lansing could not be used for the 1956 tests because of construction on that roadway, and were replaced by test areas on US-27 south of St. Johns. Traffic density on the St. Johns section (7000 vehicles daily) is, however, lower than on the 1955 test section (9,300 vehicles daily). Thus, the lower traffic density was expected to yield higher service factor values for the 1956 paints than for identical 1955 test points which had been subjected to heavier traffic.

Comparison of final "service factor" values in Table 2, for paints produced by the same manufacturer in both the 1955 and 1956 tests, shows a better rating for four 1956 paints, equivalent for two, and inferior for one. The same comparison for the yellow paints shows a better rating for seven paints and inferior for one.

No recommendation is made concerning paints to be selected for bids. If the 50-percent, one-year service factor were used as the minimum acceptable value, then six white paints and six yellow paints would be eligible for bid requests.

TABLE 1

QUALIFICATION TEST RESULTS  
1956 Performance Paints

Paint No.	Color	Reflectivity Percent	Consistency K. U. - 77°F	Drying Time Field - Avg. Minutes	Bleeding Index		Settling Index
					Asphalt	Tar	
White							
93		77.9	66	26	7.0	3.3	8
98		78.9	81	36	5.0	4.0	7
100		85.7	70	34	6.0	4.0	5
102		80.8	67	19	7.0	5.0	7
104		88.8	72	46	7.0	4.0	8
106		89.2	71	32	6.5	5.5	8
108		90.0	76	28	7.3	4.3	8
110		87.4	67	73	7.3	4.3	8
112		75.7	75	29	7.3	4.3	8
114		80.7	73	39	7.3	3.7	7
116		83.4	72	33	8.7	5.0	8
120		80.3	92	52	9.0	6.0	8
Yellow							
99	P <sub>g</sub> *	53.0	77	29	5.0	5.3	7
101	P <sub>o</sub>	60.5	80	34	9.0	6.0	7
103	P <sub>g</sub>	56.0	61	39	5.5	6.5	6
105	P <sub>g</sub>	62.4	67	41	7.5	5.0	6
107	F	46.5	65	38	7.0	8.0	8
109	P	58.0	73	38	7.7	5.3	8
111	P <sub>o</sub>	54.4	70	78	6.7	4.3	8
113	P <sub>g</sub>	56.5	76	32	8.3	5.0	8
115	P <sub>o</sub>	55.7	78	46	6.0	5.3	7
117	P <sub>g</sub>	56.0	72	47	7.0	5.3	7
118	P <sub>r</sub>	56.9	81	22	9.0	6.7	8
119	F <sub>g</sub>	54.3	62	25	2.3	6.0	5
121	P <sub>g</sub>	56.2	82	69	8.1	5.0	7

\*P indicates passing; F indicates failing.

Subscript o signifies exact color match with standard;

g green side of standard;

r red side of standard.

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TABLE 2

SERVICE FACTORS AND TERMINAL RATINGS\*  
1956 Transverse Stripes  
Age 371 Days

1955 Service Factor 348 days**	Paint No.	1956 Service Factors		Percent of Best	Qualification Tests (d)
		200 days	371		
White Paints					
54	120 Exp. (b)	78.1	67.8	107.4	NP
55	116	74.9	63.1	100.0	P
62	98	76.7	60.0	96.1	P
49	108 (a)	73.0	57.6	91.3	P
--	110	74.0	57.1	90.5	NP
54	112 (c)	71.1	56.5	89.5	NP
--	100	71.2	54.6	86.5	NP
55	106	70.8	54.4	86.2	P
--	104	69.0	54.0	85.6	P
--	102	68.9	54.0	85.6	P
59	114	68.8	52.4	83.0	NP
--	93	67.2	48.3	76.6	NP
Yellow Paints					
57	99	77.2	69.1	100.0	P
49	121 Exp. (b)	75.8	64.3	93.1	NP
58	107	76.6	61.6	89.2	NP
--	101	80.0	61.3	88.7	P
53	113 (c)	77.2	61.3	88.7	(P)
--	111	75.8	59.9	86.7	NP
55	109 (a)	73.7	59.5	86.1	P
37	118 Exp.	73.4	58.0	83.9	P
41	117	72.9	57.7	83.5	P
--	103	66.0	52.0	75.3	NP
--	105	71.7	51.4	74.4	P
58	115	65.0	42.3	61.2	P
--	119 Exp. (e)	57.5	40.4	58.5	NP

\* All Paints applied at rate of 16.5 gallons per mile of 4-in. stripe, with 6 pounds of drop-in beads per gallon, except as noted.

(a) Special beads, not MSHD Type III as all others

(b) Premix experimental paint, 6 pounds beads in; 2 pounds on Type III.

(c) Contain about 2.7 pounds of glass spheres per gallon of paint as pigment.

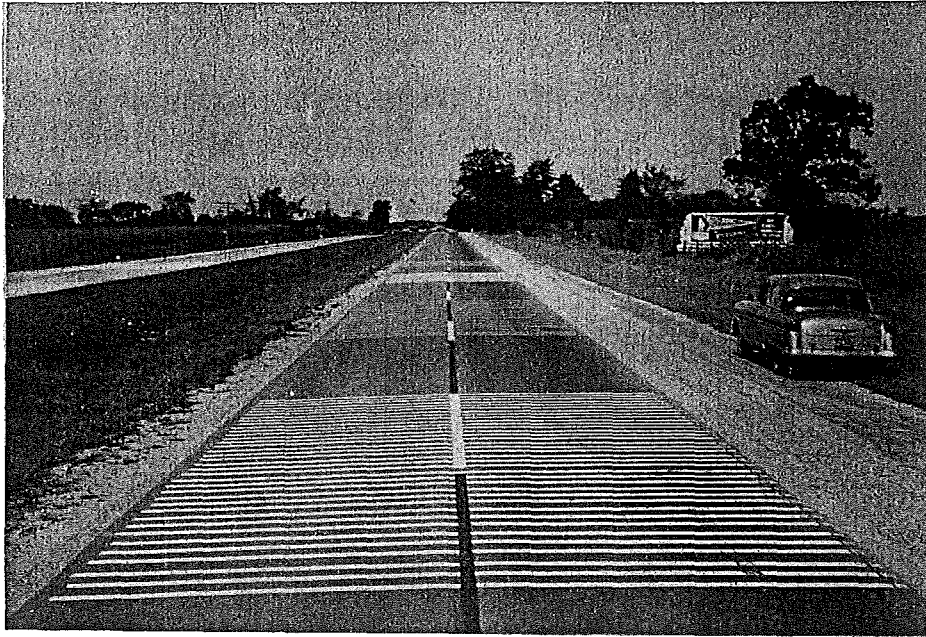
(d) P = Passing; NP = Not Passing

(e) Experimental paint applied in Sections 1 and 2 only

\*\* Not compiled on same test areas as in 1956.

TABLE 3  
EVALUATION DATA  
1956 Transverse Stripes

Exposure Days	Paint No.	White Paint												Yellow Paint												
		93	98	100	102	104	106	108	110	112	114	116	120	99	101	103	105	107	109	111	113	115	117	118	119	121
14	General Appearance	9.0	8.5	9.5	8.3	9.5	9.4	9.7	9.8	8.3	9.1	9.5	9.7	8.8	9.5	9.3	9.9	8.7	9.6	9.2	9.4	8.9	9.5	9.6	8.8	9.5
	Durability	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.9	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	9.8	10.0
	Night Visibility	6.7	9.9	5.7	6.2	5.2	7.5	7.5	6.4	5.3	6.1	5.9	6.7	6.3	9.3	4.6	6.2	8.0	7.3	7.4	7.2	8.9	5.2	6.0	4.3	5.8
	Weighted Rating	8.25	9.80	7.80	7.93	7.55	8.69	8.72	8.18	7.44	7.96	7.90	8.32	8.03	9.60	7.23	8.09	8.87	8.61	8.62	8.54	9.34	7.55	7.96	6.95	7.85
103	General Appearance	6.6	7.3	8.0	6.6	8.0	7.5	8.0	8.8	7.3	6.6	8.2	8.5	7.3	8.7	7.9	9.3	7.6	8.8	8.5	8.3	7.4	8.2	7.9	7.7	8.9
	Durability	9.5	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.6	9.9	9.7	9.6	9.8	9.7	9.8	9.8	9.8	9.7	9.8	9.4	9.8	9.7	8.0	9.7
	Night Visibility	5.6	6.2	6.2	5.6	5.9	5.5	5.7	6.3	6.2	5.9	6.2	6.8	6.7	7.3	5.2	6.9	6.4	5.8	6.7	6.9	4.8	6.8	6.6	4.8	6.3
	Weighted Rating	7.26	7.71	7.82	7.38	7.67	7.42	7.57	7.95	7.75	7.45	7.88	8.13	7.92	8.44	7.27	8.30	7.88	7.70	8.08	8.20	6.90	8.14	7.97	6.37	7.92
200	General Appearance	4.8	7.8	6.2	5.2	6.6	5.3	6.4	7.3	5.9	5.3	7.8	6.7	7.4	7.0	5.6	5.8	6.3	7.1	6.8	6.3	3.3	6.3	6.5	4.3	6.8
	Durability	5.4	8.3	6.8	6.6	6.8	6.2	7.1	7.1	7.0	6.4	8.4	7.3	8.8	7.0	5.9	5.2	7.3	7.3	7.0	7.0	3.1	6.6	6.5	3.9	7.5
	Night Visibility	2.3	1.8	3.2	3.0	2.5	2.9	3.1	3.6	4.1	2.7	4.2	5.9	5.4	3.4	3.2	2.4	4.4	3.2	3.7	4.7	1.4	4.1	4.2	2.2	5.8
	Weighted Rating	3.79	5.00	4.94	4.66	4.63	4.46	5.03	5.37	5.44	4.44	6.24	6.54	6.96	5.20	4.52	3.86	5.75	5.23	5.33	5.78	2.27	5.32	5.35	3.09	6.58
282	General Appearance	3.2	6.0	4.3	4.3	4.8	3.9	4.6	4.5	3.9	4.1	5.7	5.4	6.4	5.2	3.7	3.5	4.5	5.7	4.9	4.3	2.3	4.5	4.2	2.7	5.5
	Durability	3.7	6.6	4.7	5.0	5.3	4.9	5.5	4.8	4.9	5.1	6.4	5.7	7.9	5.7	4.9	3.8	6.0	6.1	5.9	5.4	2.1	5.1	5.2	2.5	6.0
	Night Visibility	1.3	1.5	2.1	2.4	2.0	2.1	2.2	2.4	2.8	1.6	3.3	5.3	4.2	2.0	2.4	1.5	2.8	2.4	2.5	2.8	0.9	2.8	2.7	1.7	3.8
	Weighted Rating	2.45	3.99	3.36	3.63	3.60	3.40	3.76	3.57	3.75	3.25	4.78	5.47	5.90	3.80	3.53	2.62	4.25	4.21	4.10	3.99	1.52	3.89	3.85	2.12	4.85
371	General Appearance	2.3	4.6	3.3	3.4	3.4	3.2	4.0	3.1	3.0	3.3	4.7	4.1	6.4	4.1	3.0	2.7	3.9	4.8	3.7	3.4	1.5	3.5	3.6	1.4	4.0
	Durability	2.7	5.1	3.7	3.9	4.2	4.0	4.6	3.5	3.8	3.7	5.3	4.8	7.1	4.4	3.5	3.0	4.7	4.9	4.2	4.3	1.5	3.9	4.1	1.4	4.4
	Night Visibility	1.1	1.5	1.5	1.8	1.6	1.6	2.2	1.7	2.2	1.2	2.9	5.2	3.3	1.8	2.1	1.2	2.4	2.2	2.0	2.8	0.6	2.1	2.1	0.5	4.0
	Weighted Rating	1.86	3.25	2.56	2.80	2.82	2.72	3.34	2.56	2.92	2.41	4.04	4.93	5.13	3.07	2.75	2.07	3.47	3.54	3.05	3.46	1.05	2.96	3.05	0.95	4.16



In Test Area 2 (Bituminous), 1956 white paints are in foreground, 1956 yellow paints just above them, and 1957 paints at top. A tire cut (right foreground) shown in Report 267 is still visible on the white stripes.



In Test Area 3 (Concrete), paint durability has proved especially low. Traffic density is higher here than in Area 2 (Bituminous).

Figure 1 - 1956 White Stripes after One Year's Exposure in Two Different Areas.



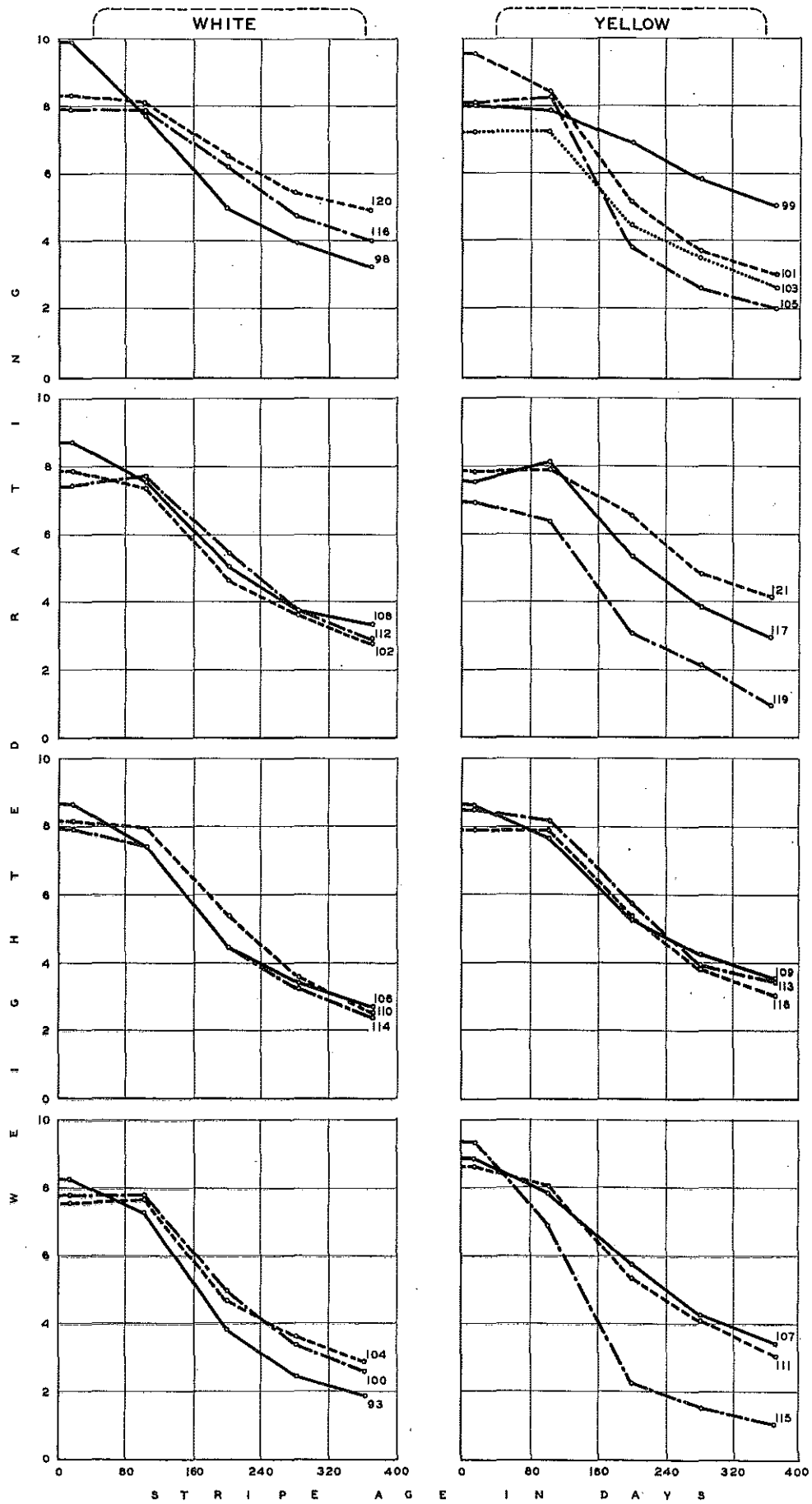


Figure 2. Weighted Ratings Vs. Stripe Age: 1966 White and Yellow Transverse Stripes

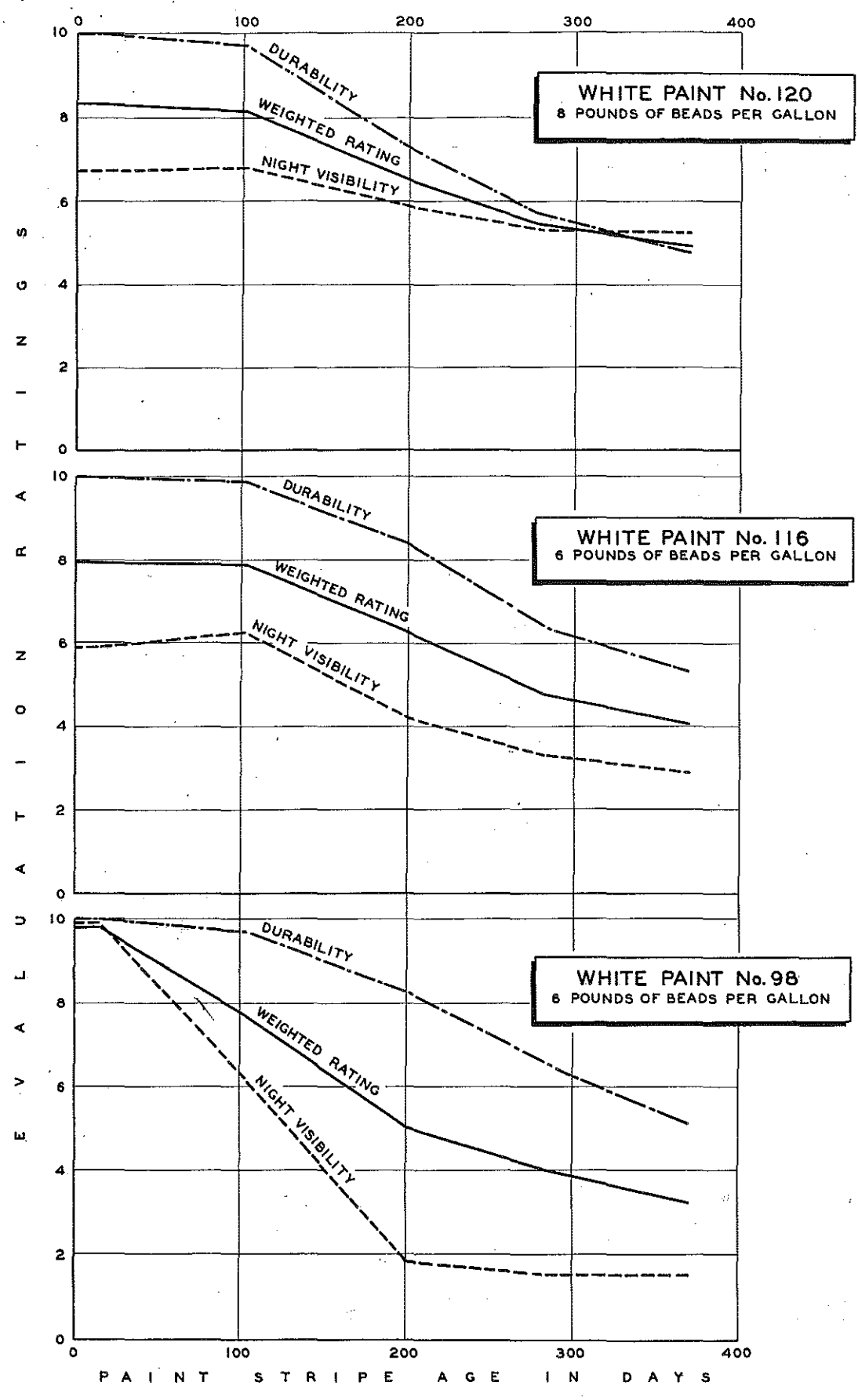


Figure 3. Evaluation Ratings Vs. Stripe Age in Days: Selected 1956 White Transverse Stripes

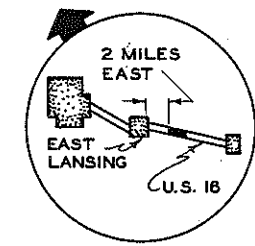
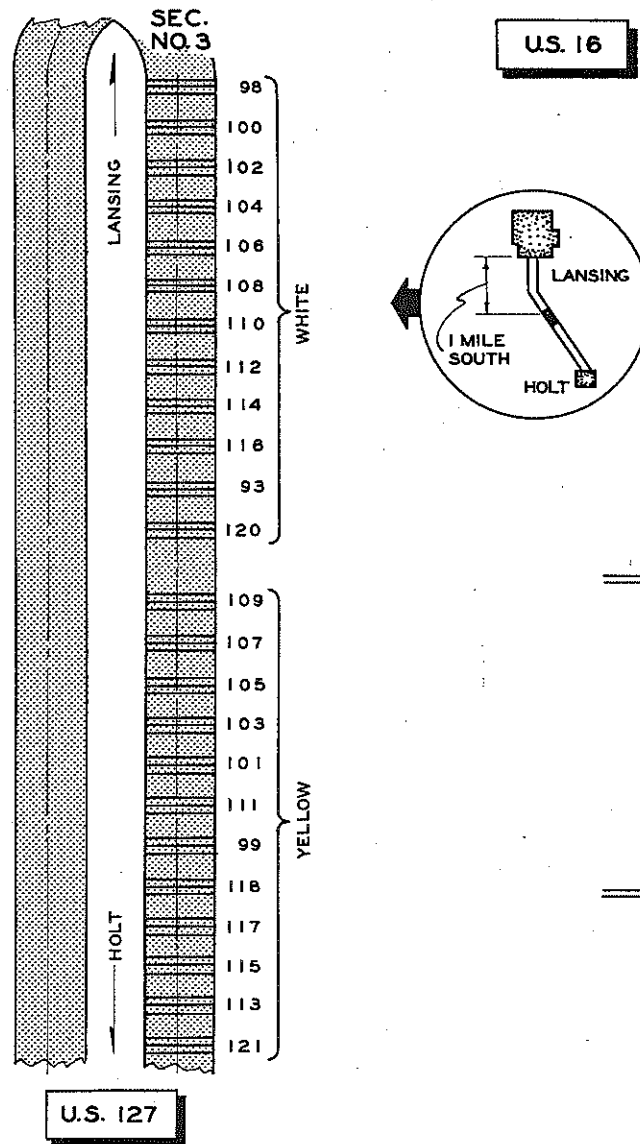
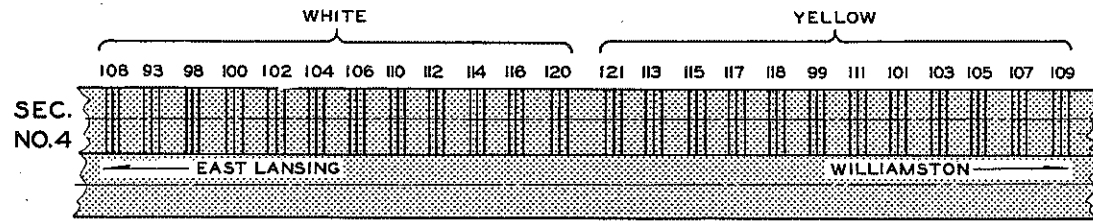
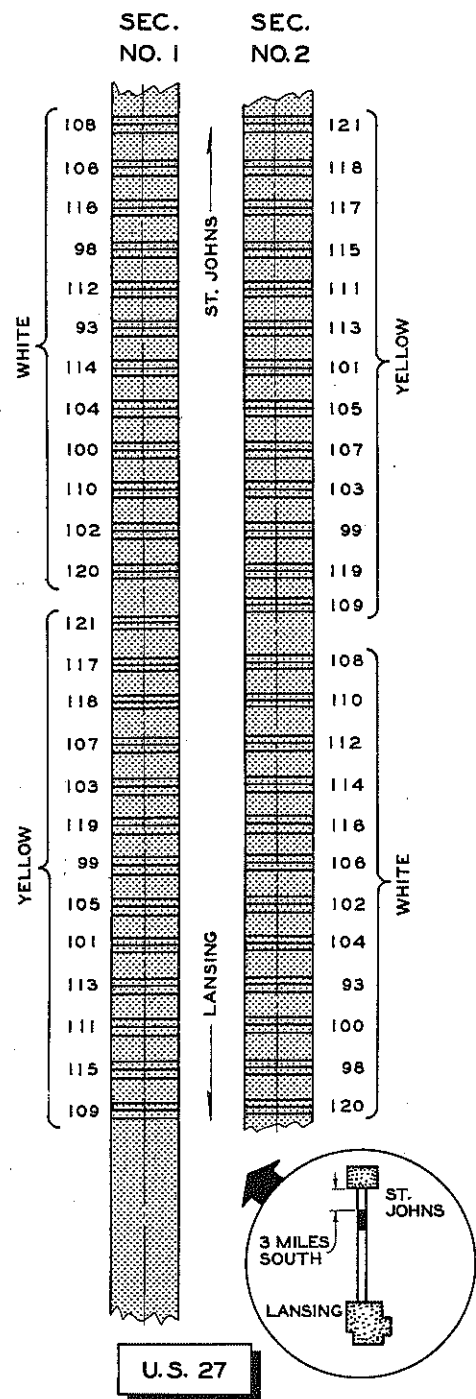


Figure 4. Locations of 1956 Traffic Paints Transverse Stripes

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