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MICHIGAN DEPARTMENT OF STATE HIGHWAYS

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Prepared for
Committee MC-D2 (Coatings, Signing & Marking Materials)
of the Highway Research Board

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The amount of pavement marking paints and materials used nationally in 1965 by State Highway Departments and by some cities and counties was determined by a recent survey conducted by Highway Research Board Committee MC-D2, "Coatings, Signing and Marking Materials."

The survey was conducted by questionnaire. The purpose was to: (a) update information obtained in a survey covering 1950 usage by State Highway Departments as presented in Highway Research Board Bulletin No. 36, "Pavement Marking," (b) obtain data from selected cities and counties for projected extrapolation to a national basis, and (c) ascertain current trends and changes in pavement marking practices from information solicited in the questionnaires.

The questionnaires, a copy of which is appended, were mailed out in late 1966. Partial replies received from State Highway Departments were briefly reviewed in a preliminary presentation to Committee at the annual meeting in January 1967.

The purpose of this report is to present the complete returns in tabulated form, and to review and summarize them.

Highway Department Usage

Questionnaire answers covering pavement markings and practices utilized by State Highway Departments are tabulated in Tables I and II.

A review of Table I, covering data from the 47 replying States, shows that they used a total of 7,591,815 gallons of white paint in 1965 of which 21 percent was premixed with glass beads and 79 percent was regular. For yellow paint the total was 3,711,536 gallons, of which 25 percent was premixed and 75 percent was regular. The total for the white and yellow paints came to 11,303,351 gallons, which amounts to about 12,000,000 gallons when projected to all 50 States.

A tabulation of this data, with that of 1950, is presented in Summary A:

Summary A

Usage of White and Yellow Marking Paints
by State Highway Departments in 1950* and 1965

	1950(1)		1965	
	Percent	gallons	Percent	gallons
Applied Striping				
White, unbeaded	53		0	
White, beaded	47		100	
Yellow, unbeaded	38		0	
Yellow, beaded	62		100	
Purchased Paint				
White, regular	Information		79	
White, premixed	Unavailable		21	
Yellow, regular	Information		75	
Yellow, premixed	Unavailable		25	
White Paint / Total white and yellow =	70		67	
Yellow Paint / Total white and yellow =	30		33	
Total White and Yellow (33 States)		1,576,010		
Total White and Yellow (47 States)				11,303,351
Total White and Yellow Estimated for all States		2,300,000		12,000,000

A comparison of the above date shows that several significant changes have occurred in the fifteen year interim. Whereas reflectorization of striping with beads was beginning to be appreciated in 1950, it being then used on about 50 percent of the striping, in 1965 it was essentially used on 100 percent of the striping in accordance with the current recommendations of the Bureau of Public Roads (3). Another change shows a 1965 annual consumption of 12,000,000 gallons of white and yellow traffic paint which is a whopping increase of 420 percent.

* Other later surveys were conducted as indicated in Reference (2) and in Appendix A, but the 1950 survey is used for comparison.

This amounts to an average annual increase of 11 + percent, compounded yearly.

The ratio of white to yellow paint has remained about the same over the interim, approximating 2 to 1.

Review of other data presented in Table I shows the 1965 usage of some new (relative to 1950) developments in pavement markings. These include:

1. Use of 4,288,797 ft of white hot-applied thermo-plastic striping and 445,427 ft of yellow. This equals about 900 miles of striping.

2. Use of 76,123 ft of white preformed striping and 138,640 ft of yellow. This equals about 40 miles of striping.

3. Use of 100,434 white buttons, (raised markers) and 5,000 of yellow. This approximates 125 miles of striping.

Another column in Table I shows that 495,175 gallons of black paint were used in 1965 by essentially seven States -- to fill in the gaps and accentuate the broken white centerline striping. In 1950, that figure was 104,650(1) gallons for the four States reporting its use.

Data from Table I covering bead consumption for stripe reflectorization are summarized below:

Summary B

Usage of Glass Beads in Paint Stripes
by State Highway Departments in 1965

	Pounds	Percent	
Treated for Moisture Resistance			
High Index	2,054,000	7	
Regular Index	25,711,200	93	
Total	27,765,200	100	52
Untreated			
High Index	312,000	1	
Regular Index	25,450,500	99	
Total	25,762,500	100	48
Total Beads, 47 States, reported	53,527,700		100
Total Beads, 50 States, estimated	57,000,000		
Total Beads, 50 States, corrected estimate to include premix beads. (equals 5.5 lbs/gal of paint)	66,000,000		

The above value of 53,527,700 pounds of beads represents the total for the 47 reporting States, some of which did not include the bead complement quantities used in their premix paints. Correcting for this, projecting the value to cover all 50 States, and taking into account the ratio values of pounds of beads used per gallon of paint, as reported by the States (values listed in Table II), a value of 66,000,000 pounds is obtained. This is considered a reasonable estimate of glass bead consumption by the State Highway Departments in 1965. The value is equivalent to 5.5 pounds of beads per gallons of paint (12,000,000) used by those agencies.

Other information solicited in the questionnaires, covering costs of paint and beads is presented in Table II, where it can be reviewed by the reader. However, we wish to single out the following Table II data for attention:

1. Of the 37 States reporting this information, an average value of 26 percent was obtained as representing the amount of total paint used in edgelines. This type of roadway delineation is new, and contributes significantly to the current total consumption of white traffic paint. No edgelining was known to be used in 1950, at time of the previous study.

2. Most of the States report using a composition-type specification covering their pavement marking paints, some use a combination specification, while seven report using solely a performance-type specification.

3. Of the 31 States having a resin-type requirement, 20 specify alkyds, 4 - dispersion resins, 3 - phenolics, 2 - chlorinated rubber, and 2 require combination of resins.

Usage by Counties

It was hoped that information on pavement marking materials, especially quantities used by all counties in the United States could be obtained by extrapolation from a representative sampling. Accordingly, questionnaires were mailed to 38 counties, located in three States.

Replies were received from about 50 percent of the counties. They were located in two States, California and Michigan. Since almost half of Michigan's counties contract their striping to a single company, a wider than requested sampling for that State was available. Data covering those and other responding counties are listed in Tables III and III A. For easy reference the quantity data from the Tables are summarized below:

Summary C

1965 Usage of Marking Materials
by Reporting California and Michigan Counties

	Quantities	Percent Premix	Percent
10 California Counties			
White paint	71,305 gals	5.7	62
Yellow paint	43,930 gals	6.0	38
Total	115,235 gals		100
Black paint	6,487 gals		5.6*
Colored paints	3,350 gals		2.9*
Thermoplastic	40,000 lbs		0.3*
Other markings	Experimental		
Glass beads (equals 4.2 lb/gal)	486,700 lbs		
Projected estimate for all 58 California counties			
White and yellow paint	660,000 gals		
Black paint	37,000 gals		
Colored paints	19,000 gals		
Thermoplastic	130,000 lbs		
Glass beads	2,820,000 lbs		
49 Michigan Counties			
White paint	39,359 gals	0	59
Yellow paint	28,388 gals	0	41
Total	67,747 gals		100
Black paint	8,900 gals		13.1*
Other markings	Experimental		
Glass beads (equals 5.9 lb/gal)	399,235 lbs		
Projected estimate for all 83 Michigan counties			
White and yellow paint	115,000 gals		
Black paint	15,000 gals		
Glass beads	675,000 lbs		

* Based on total of white and yellow paint.

Projecting the total quantities of markings from the responding counties to a State-wide basis, was done by multiplying the totals by a factor of 58/10 for California and 83/49 for Michigan. The factor is a ratio ot total number of counties in each State divided by total of responding counties. The projected estimates on quantities are shown in the lower part of the two State portions of Summary C. They are believed to be reasonable projected estimates, though the California projection may be high because the survey replies were from the larger and more populated counties.

Projecting the above estimates to a nation-wide basis is done with much less certainty in the following manner:

	Calif.	Mich.	Cal. + Mich.
White & yellow paint, gals	660,000	115,000	775,000
Black paints, gals	37,000	15,000	52,000
Colored paints, gals	19,000	----	19,000
Thermoplastic, lbs	130,000	----	130,000
Glass beads, lbs	2,820,000	675,000	3,495,000
1965 Population	18,200,000	8,300,000	26,500,000

and multiplying the addition quantity values by a factor (based on population) of 194,000,000/26,500,000 = 7.3

where 194,000,000 = 1965 population in U. S.

Note: The seemingly logical factor of 50/2 (based on ratio of States) could have been used instead of above, (7.3), but it was felt that the latter was more accurate since the quantity values are not obtained from average States, but two of the larger and more populous ones. Other factors could be used. *

Accordingly, the estimated quantities of pavement marking materials used by all of our counties in 1965 become the following:

1. 5,500,000 gals of white and yellow traffic paint.

2. 380,000 gals of black paint in ratio of 6.7/100 of above.

3. 140,000 gals of colored paints, in ratio of 2.5/100 of (1) above.

4. 900,000 lbs of hot-applied thermoplastic striping, equivalent to about 510 miles of 4 in., or 7,000 gals of paint. Ratio is 0.13/100 of (1) above.

5. 25,000,000 lbs of glass beads in ratio of 4.6 lb/gal of (1) above.

6. Experimental amounts of preformed striping and raised markers.

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* One based on a county road ratio could have been used as outlined in Appendix B.

Other information solicited in the questionnaires, including costs, centerline stripe-skip spacing, percent of paint striping in edgelines, and application agency is listed in Table III. This shows that, (a) the centerline arrangement tends to follow that of that State, (b) edgelines are applied by some and in significant amounts by a few counties, and (c) stripe application under a contract arrangement to an outside agency is utilized by many.

Usage by Cities

It was hoped that information on pavement marking materials, especially quantities used by all cities in the United States, could be obtained by extrapolation, from a representative sampling. Accordingly, questionnaires were mailed to 105 cities, selected to be representative as to location, size, and frequency of occurrence; this total, however, did include several of the larger cities, as extras.

Thirty-four replied with thirty-two supplying quantity data. This is a 32 percent response, which was somewhat disappointing, especially since it was thin in representing some sections of the country.

Data furnished by the responding cities are listed in Table IV. As noted, they report using 220,510 gallons of white paint of which 27 percent was premixed, and 145,900 gallons of yellow of which 32 percent was premixed. For easy reference this and some other data from Table IV are summarized below:

Summary D

1965 Usage of Marking Materials as reported by 32 Cities having a Population of 21,720,000

	Quantities	Percent	
Total white paint	220,510 gals	100	60
White premixed		27	
Total yellow paint	145,900 gals	100	40
Yellow premixed		32	
Total white and yellow	366,410 gals		100
Total black paint	8,887 gals		2.4*
Total other paint (red, green, etc.)	17,632 gals		4.8*
Thermoplastic stripe	2,051,815 ft		
Preformed stripe	24,940 ft		
Buttons	53,287		
Glass Beads, reported (equals 3.4 lb/gal of white and yellow paint)	1,234,150 lbs	* Based on total of white and yellow paint	
Glass Beads, corrected estimate to include premix beads (equals 4 lb/gal)	1,466,000 lbs		

A review of above reported value for bead consumption, 1,234,150 pounds, shows it to equal 3.4 lbs per gal of white and yellow paint. Since some of the respondents did not include their premix complement, we have corrected the rate to 4 lbs/gal of paint. This gives a corrected value of 1,466,000 lbs as a reasonable estimate of bead consumption, for the reporting cities.

Other pavement marking paints used by the cities included, (a) black, and (b) red, green, etc. colored paints in the ratio of 2.4 and 4.8 gals per 100 gals of white and yellow paint, respectively.

Other pavement markings, included:

1. Use of 2,051,815 ft of white and yellow hot-applied thermoplastic paint. This equals about 380 miles of striping.

2. Use of 24,940 ft of white and yellow preformed striping. This equals about 5 miles of striping.

3. Use of 53,287 white and yellow buttons. This approximates 63 miles of striping.

All of above are used in significantly higher ratio, compared to white and yellow traffic paint, than that calculated for the State Highway Departments. This greater usage is not unexpected.

Cost data reported by the cities for their striping materials are listed in Table IV.

To project the quantity data covering white and yellow traffic paints, from the sampled cities, to a national basis, we used information tabulated in the two right hand columns of Table IV. This gives an average consumption of 29.6 gals of white and yellow pavement marking paint per 1000 population of the reporting cities. Projecting this to a national basis by the following calculation, one obtains:

$$\frac{29.6}{1000}\,(194,000,000)\,(0.7) \cong 4,000,000 \text{ gals of white and yellow paint.}$$

where 194,000,000 = 1965 population in U. S.
0.7 = population fraction living in cities

This is believed to be a reasonable projected estimate on the quantity of white and yellow traffic paint used by cities, based on available information. Projected values for other pavement markings are given in the summary.

Note: The ratio of 220,510 gals of white plus 145,910 gals of yellow/ 21,720,000 = 0.0169 was not used in place of 0.0296 in the above calculation, since that is weighted heavily in favor of the large city, i.e., $21,720,000/32 \cong$ 680,000 average population.

SUMMARY

I. Survey data covering the amounts of pavement markings and beads used by some government agencies, when projected to a national basis, show the following estimated consumption for 1965.

A. Pavement Markings, also shown graphically in Figure 1.

1. State Highway Departments

a. 12,000,000 gals of white and yellow paint of which 67 percent was white.

b. 496,000 gals of black paint, in ratio of 4.1/100 of above paint.

c. Other markings:

i. 900 miles of hot applied white and yellow thermoplastic striping.

ii. 40 miles of white and yellow preformed striping.

iii. 125 miles of raised button markers.

The three replace about 16,000 gals of (a) above in ratio of 0.13/100 of paint.

2. Counties

a. 5,500,000 gals of white and yellow paint of which 61 percent was white.

b. 380,000 gals of black paint, in ratio of 6.7/100 of above paint.

c. 140,000 gals of red, grey, etc. colored paints, in ratio of 2.5/100 of (a) above.

d. 900,000 lbs of hot applied thermoplastic striping, equivalent to 7,000 gals of paint, in ratio of 0.13/100 of (a) above.

e. Experimental amounts of preformed striping and raised markers.

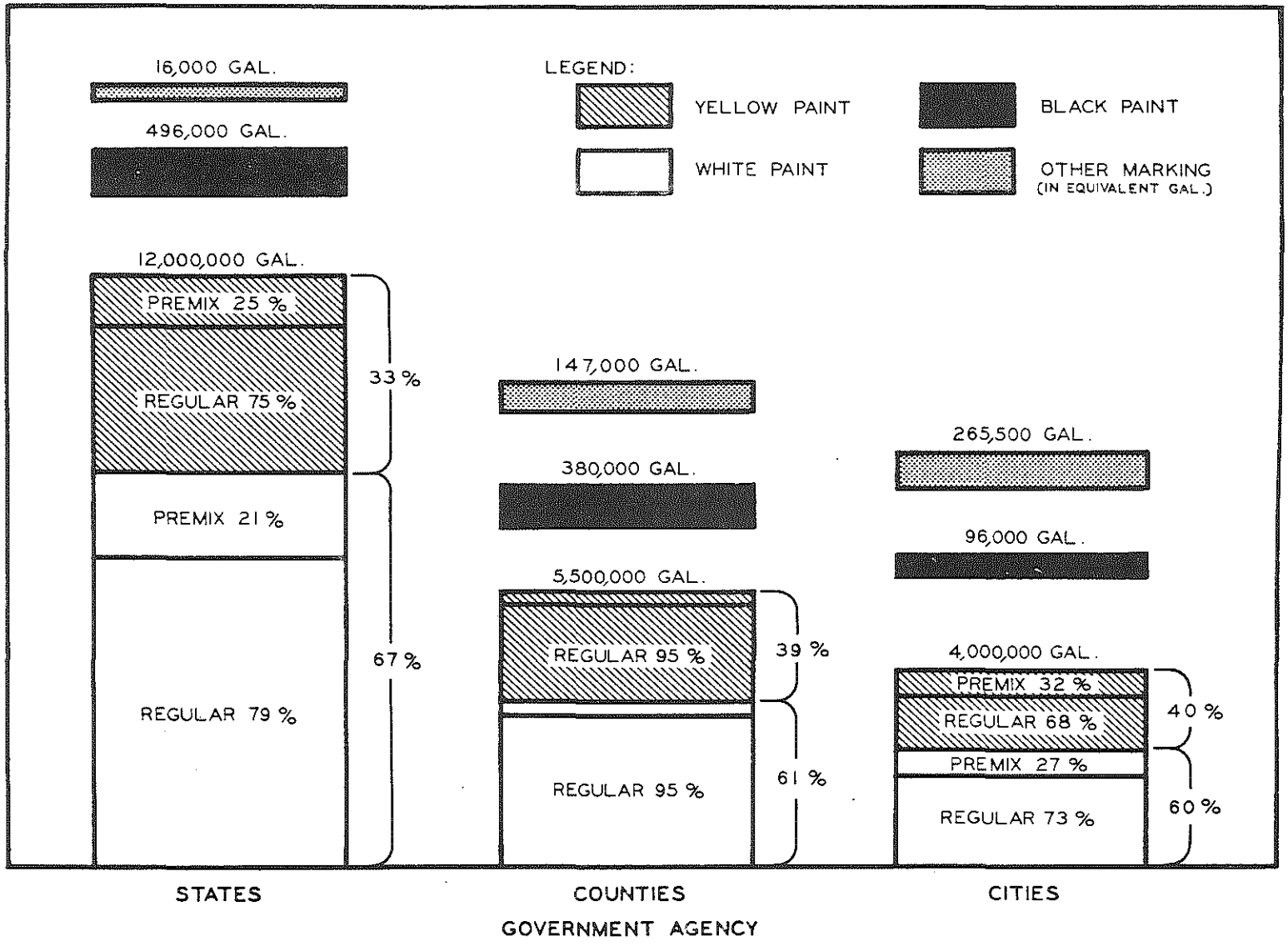

Figure 1. Estimated Quantities of Markings Used on Roadway Systems in U.S. in 1965.

3. Cities

a. 4,000,000 gals of white and yellow paint of which 60 percent was white.

b. 96,000 gals of black paint, in ratio of 2.4/100 of above paint.

c. 192,000 gals of red, green, etc. colored paints, in ratio of 4.8/100 of (a) above.

d. 4,900 miles of thermoplastic, preformed, and raised button markers, equivalent to about 73,500 gals of paint, in ratio of 1.8/100 of (a) above.

B. Glass Beads

Glass beads for the reflectorization of white and yellow paints amounted to 107,000,000 pounds, with 66,000,000 pounds used by Highway Departments, 25,000,000 pounds by counties, and 16,000,000 pounds by cities. The respective ratios are 5.5, 4.6, and 4 lbs per gallon of paint. Fifty-two percent of beads used by the State Highway Departments was treated to be moisture resistant.

II. Review of above data shows that the following significant changes have taken place since the 1950 survey covering usage by State Highway Departments.

A. The annual use of white and yellow paint by Highway Departments has increased from 2,300,000 gallons to 12,000,000 gallons in 1965. This is a 420 percent increase. Adoption of edgelining during the interim significantly contributes to the increase.

B. Glass bead consumption has increased by about 840 percent, twice the above value, because Highway Department in 1965 reflectorized all of their paints, compared to 50 percent in 1950. Most cities and counties also reflectorized their paint striping in 1965.

C. New developments in striping, such as hot-applied thermoplastic, preformed, and raised button markers, were being used by the various agencies, but replaced less than 1 percent of the standard paint in 1965.

D. Colored paints were being used by agencies in 1965 for some color coding of traffic marking. So-called "fast dry" traffic paints were being applied by several of the larger cities in 1965, as a comparatively recent development.

REFERENCES

(1). G. W. Ashman, "Present Preferences for Traffic Paint," H.R.B. Bulletin No. 36, "Pavement Marking."

(2). Committee on Paints and Marking Materials, "A Study of Traffic Paint Specifications," H.R.B. Circular 347, October 1957.

(3). Bureau of Public Roads, "Manual on Uniform Traffic Control Devices for Streets and Highways," pp. 119, June 1961.

ACKNOWLEDGMENT

We are especially thankful to the responding agencies for supplying the requested information which made this survey possible.

TABLE I

PAVEMENT MARKING MATERIALS USED BY STATE HIGHWAY DEPARTMENTS IN 1965

No.	State	Paints and Markings												Beads			
		White					Yellow					Black Paint, gals	Other Markings	Treated, lbs		Untreated, lbs	
		Paint, gals		Thermo-plastic, Stripe-ft	Preformed, Stripe-ft	Buttons No.	Paint, gals		Thermo-plastic, Stripe-ft	Preformed, Stripe-ft	Buttons, No.			High Index	Regular Index	High Index	Regular Index
		Premixed	Regular				Premixed	Regular									
1	Alabama	60,000	----	----	----	----	48,000	----	----	----	----	----	----	----	----	----	----
	Alaska	----	49,065	----	----	----	----	15,785	----	----	----	----	----	----	172,500	----	----
	Arizona	----	75,185	----	----	----	----	29,270	----	----	----	----	----	----	----	----	737,500
	Arkansas	98,144	4,924	16,140	----	274	90,784	475	----	----	----	----	----	----	----	----	43,000
5	California	----	200,000	1,000,000	20,000	10,000	----	80,000	20,000	----	5,000	20,000	----	----	----	----	1,000,000
	Colorado	----	217,765	----	----	----	----	71,180	----	----	----	----	----	----	----	----	1,780,000
	Connecticut	----	65,400	300,000	----	----	----	54,400	----	----	----	----	----	700,000	----	----	----
	Delaware	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Florida	----	280,000	----	----	----	----	48,000	----	----	----	70,000	----	----	1,240,000	----	----
10	Georgia	----	303,029	----	----	----	----	139,535	----	----	----	954	----	----	----	----	2,434,000
	Hawaii	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Idaho	----	33,000	----	----	----	----	23,000	----	----	----	----	----	----	----	----	317,000
	Illinois	----	576,894	1,079,970	----	----	----	90,537	19,140	----	----	57,521 (t)[1] 84,250 (a)	----	----	2,960,000	----	----
	Indiana	----	292,060	525,230	----	----	----	91,850	399,719	----	----	----	----	----	2,154,700	----	----
15	Iowa	----	94,153	----	----	----	----	90,915	----	----	----	----	----	----	----	----	807,000
	Kansas	----	167,826	----	----	----	----	123,460	----	----	----	----	----	----	1,748,000	----	----
	Kentucky	145,500	10,000	511,814-4" 12,417-8"	----	----	----	----	----	----	----	----	----	----	----	----	----
							196,375	----	----	----	----	----	----	----	675,000	----	----
	Louisiana	210,000	4,500	----	----	----	55,000	2,300	----	----	----	----	----	----	----	----	496,000
	Maine	----	60,000	----	----	----	----	25,000	----	----	----	----	----	----	510,000	----	----
20	Maryland	----	92,240	----	----	----	----	53,850	----	----	----	----	----	1,000,000	----	----	----
	Massachusetts	----	74,525	----	4,140	----	----	43,280	----	----	----	----	----	----	----	----	707,000
	Michigan	----	248,000	----	20,000	----	170	40,000	----	130,000	----	51,750	Exp Blue Pt.	----	----	----	1,680,000
	Minnesota	188,300	----	----	----	----	38,900	----	----	----	----	18,000	----	----	----	----	----
	Mississippi	----	80,000	----	----	----	----	65,000	----	----	----	----	----	----	870,000	----	----
25	Missouri	----	259,000	----	----	----	----	111,500	----	----	----	150,000	----	----	2,606,000	----	----
	Montana	89,600	----	----	520	----	50,690	----	----	----	----	----	----	----	561,000	----	----
	Nebraska	----	66,000	23,127	----	----	----	35,000	----	----	----	----	Exp Buttons	----	530,000	----	----
	Nevada	----	24,000	----	----	----	----	13,000	----	----	----	50	----	----	150,000	----	----
	New Hampshire	----	20,000	----	----	----	----	32,000	----	----	----	----	----	----	----	312,000	----
30	New Jersey	----	26,870	----	----	----	----	17,100	----	----	----	150	----	----	----	----	225,000
	New Mexico	----	108,830	----	Exp	Exp	----	62,735	----	Exp	Exp	----	----	----	----	----	812,000
	New York	----	223,345	600,270	----	----	----	130,550	1,420	----	----	----	----	----	1,985,000	----	----
	North Carolina	482,000	500	----	Exp	Exp	287,150	500	----	Exp	Exp	----	----	----	1,875,000	----	1,500,000
	North Dakota	35,000	----	----	7,200	----	15,000	----	----	8,640	----	----	----	----	----	----	----
35	Ohio	----	325,000	----	----	----	----	140,000	----	----	----	----	----	4,000	----	----	2,864,000
	Oklahoma	----	108,135	----	----	----	----	58,080	----	----	----	----	----	----	989,000	----	----
	Oregon	----	246,280	38,900	4,263	Exp	----	34,590	5,148	----	Exp	----	----	----	1,242,000	----	----
	Pennsylvania	----	384,740	----	----	----	----	295,655	----	----	----	----	----	----	3,750,000	----	----
	Rhode Island	----	10,000	----	----	----	----	13,000	----	----	----	----	----	----	----	----	156,000
40	South Carolina	----	145,000	95,870	20,000	----	----	33,000	----	----	----	----	----	----	----	----	1,000,000
	South Dakota	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Tennessee	150,000	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	Texas	----	485,425	----	----	Exp	----	370,100	----	----	Exp	----	----	----	----	----	4,550,000
	Utah	----	78,000	----	----	----	----	45,000	----	----	----	3,000	----	----	----	----	697,000
45	Vermont	----	30,000	----	----	----	----	40,000	----	----	----	----	----	350,000	----	----	----
	Virginia	----	195,240	----	----	----	----	95,920	----	----	----	----	----	----	----	----	1,716,000
	West Virginia	136,000	----	----	----	----	91,000	----	----	----	----	----	----	----	519,000	----	----
	Washington	----	138,470	38,674	----	90,000	----	39,650	----	----	----	----	----	----	724,000	----	218,000
	Wisconsin	----	155,920	46,390	----	160	----	79,250	----	----	----	38,600	----	----	----	----	1,411,000
50	Wyoming	----	37,950	----	----	----	----	29,000	----	----	----	----	----	----	----	----	300,000
	TOTALS	1,594,544	5,997,271	4,288,797	76,123	100,434+	948,069	2,963,467	445,427	138,640+	5,000+	495,175		2,054,000	25,271,200	312,000	25,450,500

[1] t = tar, a = asphalt
Exp = experimental

TABLE II
ADDITIONAL INFORMATION ON PAVEMENT MARKING MATERIALS FOR STATE HIGHWAY DEPARTMENTS IN 1965

No.	State	Beads		Center-line Stripe and Skip, ft	Striping, percent			Average Wet-film Thickness, mils	Costs										Paint Specification Requirements		
									White				Yellow				Other	Beads, $/lb						
									Paint, $/gal		Thermo-plastic $/ft	Buttons $/each	Paint, $/gal		Thermo-plastic $/ft	Buttons $/each		Treated		Regular				
		lbs/ gal	Type[1] Applic-ation		Edge-lines	Lanes	Center-lines		Pre-mixed	Regular			Pre-mixed	Regular			$/shown Unit	High Index	Regular Index	High Index	Regular Index	Comp.	Perf.	Resin Type
1	Alabama	4.7	p	15-25	20	1	79	15	3.03	----	----	----	3.10	----	----	----	----	----	----	----	----	x	x	----
	Alaska	6	do	15-25	57	5	38	----	----	2.17	----	----	----	2.32	----	----	----	----	0.146	----	----	x	---	----
	Arizona	7	do	15-25	1	20	79	15	----	1.85	----	----	----	2.28	----	----	----	----	----	----	0.099	x	---	disp. resin
	Arkansas	4.2(8)	p(do)	15-25	8	10	82	----	2.17	2.71	0.48	1.29	2.25	3.22	----	----	----	----	----	----	----	x	---	phenolic
5	California	6	do	9-15	----	----	----	15	----	2.00	0.75	0.50 & 1.10	----	2.40	1.00	1.10	2.20/gal of black	----	----	----	0.120	x	---	chl. rubber
	Colorado	6	do	15-25	30	30	40	15	----	1.26	----	----	----	1.50	----	----	----	----	----	----	0.103	x	---	alkyd
	Connecticut	6	do	15-25	34	18	48	15	----	2.10	0.34	----	----	2.16	----	----	----	0.13	----	----	----	x	x	----
	Delaware	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	----
	Florida	6	do	15-25	41	9	50	15	----	1.31	----	----	----	1.45	----	----	1.05/gal of black	----	.125	----	----	x	---	alkyd
10	Georgia	5.5	do	15-25	42		58	15	----	1.26	----	----	----	1.49	----	----	2.30/gal of black	----	----	----	0.095	x	---	alkyd
	Hawaii	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	----
	Idaho	5	do	20-30	6	37	57	----	----	1.90	----	----	----	2.65	----	----	----	----	----	----	0.105	---	x	----
	Illinois	4.5	do	15-25	64	1	35	20	----	1.44	0.30	----	----	1.78	0.31	----	0.39/gal of tar 0.45/gal of asphalt	----	.119	----	----	x	---	disp. resin
	Indiana	6	do	15-25	38	5	57	15	----	1.51	0.30	----	----	1.87	0.30	----	----	----	.123	----	----	x	x	----
15	Iowa	4.4	do	15-25	7	7	86	17	----	1.50	----	----	----	1.90	----	----	----	----	----	----	.108	x	---	alkyd
	Kansas	6	do	17.5-32.5	21	----	79	18	----	1.40	----	----	----	1.70	----	----	----	----	.128	----	----	---	---	----
	Kentucky	4.2/2.0	o	15-25	----	----	----	15	1.98	1.59	0.32-4" 0.57-8"	----	2.03	----	----	----	----	----	.110	----	----	---	x	----
	Louisiana	4.2/2(6)	o(do)	15-25	15	10	75	13	1.51	2.48	----	----	1.70	2.67	----	----	----	----	----	----	.090	x	----	phenolic
	Maine	6	do	15-25	10	15	75	15	----	1.91*	----	----	----	2.29*	----	----	----	----	----	----	----	x	x	alkyd
20	Maryland	6	do	15-25	20	20	60	18	----	1.38	----	----	----	1.73	----	----	----	.124	----	----	----	x	x	alkyd
	Massachusetts	6	do	15-25	35	----	65	15	----	1.98*	----	----	----	2.28*	----	----	----	----	----	----	----	x	x(Exp)	----
	Michigan	6	do	20-30	45	----	55	15	----	1.31	----	----	3.50	1.59	----	----	0.36/gal of black 0.15/ft preformed	----	----	----	.083	---	x	----
	Minnesota	4.4	p	19-31	61	5	34	14 11(e)	1.92	----	----	----	2.15	----	----	----	1.49/gal of black	----	----	----	----	x	---	alkyd
	Mississippi	6	do	15-25	9	4	87	10	----	----	----	----	----	2.37	----	----	----	----	.124	----	----	x	x	phenolic
25	Missouri	6	do	15-20	9	11	80	18	----	1.61	----	----	----	2.26	----	----	0.42/gal of black	----	.112	----	----	x	---	disp. resin
	Montana	4	p	15-25	17	4	79	15	----	1.76	----	----	----	2.00	----	----	1.85/ft preformed	----	----	----	----	x	---	alkyd
	Nebraska	5.3	do	15-25	8	6	86	15	----	1.83	0.35-4" 0.68-8"	----	----	1.87	----	----	----	----	.129	----	----	x	x	chl. rubber
	Nevada	6	do	15-25	----	----	----	----	----	1.97	----	----	----	2.26	----	----	1.80/gal of black	----	.127	----	----	x	x	chl. rubber
	New Hampshire	6	do	15-25	14	3	83	18	----	1.75*	----	----	----	1.75*	----	----	----	----	----	----	----	x	---	alkyd
30	New Jersey	5	do	15-25	50	35	15	15	----	1.50	----	----	----	1.75	----	----	2.85/gal of black	----	----	----	.101	x	x	alkyd
	New Mexico	6	do	15-25	13	23	64	15	----	1.92	----	----	----	2.22	----	----	----	----	----	----	.11	x	---	chl. rubber pv. toluene
	New York	6	do	15-25	24	----	76	12-15	----	1.69	0.33	----	----	1.72	0.33	----	----	----	.125	----	----	x	---	----
	North Carolina	4/2.5	o	15-25	25	10	65	15	1.89	1.89	----	----	2.40	2.40	----	----	----	----	.133	----	.085	x	x	alkyd
	North Dakota	4.5	p	15-25	2	8	90	8	2.11	----	----	----	2.21	----	----	----	0.18/ft preformed	----	----	----	----	x	x	disp. resin
35	Ohio	6	do	15-25	----	----	----	15	----	1.19	----	----	----	1.25	----	----	----	.16	----	----	.096	---	x	----
	Oklahoma	6	do	15-30	----	----	----	----	----	1.56	----	----	----	1.60	----	----	----	----	.103	----	----	---	x	----
	Oregon	5	do	15-25	33	----	67	10	----	1.36	0.33	----	----	1.63	0.33	----	0.55/ft preformed	----	----	----	----	---	x	----
	Pennsylvania	6	do	15-25	48	----	52	15	----	1.17	----	----	----	1.47	----	----	----	----	.124	----	----	x	x	alkyd
	Rhode Island	6	do	----	10	25	65	15	----	1.47	----	----	----	1.86	----	----	----	----	.125	----	----	x	x	alkyd
40	South Carolina	6	do	15-25	20	5	75	20	----	1.39	0.33	----	----	1.25	----	----	0.37/ft preformed	----	----	----	.104	x	x	alkyd
	South Dakota	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	----
	Tennessee	6	p	15-25	----	----	----	15	2.75	----	----	----	2.95	----	----	----	----	----	----	----	----	x	---	alkyd
	Texas	6	do	15-25	----	6	94	15	----	1.44	----	----	----	1.68	----	----	----	----	----	----	.062	x	---	alkyd
	Utah	6	do	15-25	40	30	30	15	----	1.75	----	----	----	1.94	----	----	1.95/gal of black	----	----	----	.099	x	---	alkyd
45	Vermont	5	do	15-25	----	----	----	11	----	1.74*	----	----	----	1.83*	----	----	----	----	----	----	----	x	---	alkyd
	Virginia	6	do	15-25	----	----	----	15	----	1.37	----	----	----	1.32	----	----	----	----	----	----	.105	x	---	alkyd
	West Virginia	4/2	o	15-25	----	----	----	15	2.47	----	----	----	2.79	----	----	----	----	----	.124	----	----	x	---	----
	Washington	6/6/6	p/o/do	15-25	20	----	80	20	----	1.75	1.26	0.42	----	2.28	----	----	----	----	.132	----	.109	x	---	syn. rubber petr. resin
	Wisconsin	6	do	15-25	40	----	60	15	----	1.80	1.02	1.08	----	1.89	----	----	0.55/gal of black	----	----	----	----	---	x	----
50	Wyoming	4-5	do	15-25	10	3	87	6-8	----	1.27	----	----	----	1.55	----	----	----	----	----	----	.105	x	---	alkyd

[1] do = drop-on, o = overlay, p = premix

NOTE: * Cost includes bead complement.

e = edgelines

TABLE III
QUANTITY AND DETAILS OF PAVEMENT MARKINGS FOR SOME CALIFORNIA COUNTIES IN 1965

No.	State Identification No.	County	Paints, gals			Miscellaneous Striping Materials	Beads, lbs	Centerline Stripe-skip, ft	Edgelines, percent	Paint and Material Costs, dollars/unit				Applied by
			White	Yellow	Black					White	Yellow	Black	Misc.	
1	5-1	Alameda	2,225[1]	2,630[1]	380	125g (r)	0	15-25	1	3.40	3.58	2.54	3.23	Self
	5-2	Kings	3,400	500	----	----	25,000	9-15	0	2.75	2.95	----	----	Self
	5-3	Los Angeles	37,030	24,800	170	p-500; 2675 (g, r) 40,000 (t)	376,600	----	----	----	----	----	----	Self
	5-4	Madera	6,000	5,000	4,000	----	600	9-15	0	2.00	2.40	1.82	----	Self
5	5-5	Mendocino	1,000	----	----	----	----	9-15	0	2.80	----	----	----	Self
	5-6	Monterey	4,000	3,100	----	p-300 (w, r)	yes	----	7	----	----	----	p-0.38	Contract
	5-7	Napa	1,500	700	----	b-200 (w)	2,500	9-15	3	2.44	2.62	----	b-0.45	Self
	5-8	San Bernardino	1,850[1] 6,000	4,000	----	540g	40,000	9-15	0	3.75[1] 2.33	2.51	----	3.51	Self
	5-9	San Luis Obispo	1,800	700	----	10g	12,000	9-15	10	2.86	2.90	----	2.75	Self
10	5-10	Santa Clara	6,500	2,500	2,000	----	30,000	9-15	15	2.48	2.36	1.87	----	Self
	5-11	Shasta	----	----	----	----	----	----	----	----	----	----	----	Contract
	Totals for State		71,305	43,930	6,487	3.350 g p-200 d-800 40,000 (t)	486,700	----	----	----	----	----	----	----

TABLE IIIA
QUANTITY AND DETAILS OF PAVEMENT MARKINGS FOR SOME MICHIGAN COUNTIES IN 1965

No.	State Identification No.	County	Paints, gals			Miscellaneous Striping Materials	Beads, lbs	Centerline Stripe-skip, ft	Edgelines, percent	Paint and Material Costs, dollars/unit				Applied by
			White	Yellow	Black					White	Yellow	Black	Misc.	
1	22-1	Alcona	95	138	----	----	1,385	20-30	0	----	----	----	----	Contract to KC Co.
	22-2	Alpena	305	255	----	----	3,360	20-30	20	----	----	----	----	Contract to KC Co.
	22-3	Antrim	370	765	----	----	6,750	20-30	0	----	----	----	----	Contract to KC Co.
	22-4	Arenac	330	79	----	----	2,450	20-30	0	----	----	----	----	Contract to KC Co.
5	22-5	Baraga	10	18	----	----	175	20-30	0	----	----	----	----	Contract to KC Co.
	22-6	Bay	1,050	1,000	----	----	12,300	20-30	0	----	----	----	----	Contract to KC Co.
	22-7	Benzie	250	510	----	----	4,560	20-30	0	----	----	----	----	Contract to KC Co.
	22-8	Charlevoix	132	240	----	----	2,230	20-30	0	----	----	----	----	Contract to KC Co.
	22-9	Cheboygan	265	185	----	----	2,700	20-30	0	----	----	----	----	Contract to KC Co.
10	22-10	Chippewa	160	98	----	----	1,550	20-30	0	----	----	----	----	Contract to KC Co.
	22-11	Clare	300	495	----	----	4,770	20-30	0	----	----	----	----	Contract to KC Co.
	22-12	Crawford	285	390	----	----	4,050	20-30	0	----	----	----	----	Contract to KC Co.
	22-13	Delta	190	128	----	----	1,910	20-30	0	----	----	----	----	Contract to KC Co.
	22-14	Dickinson	60	119	----	----	1,075	20-30	0	----	----	----	----	Contract to KC Co.
15	22-15	Emmet	415	696	----	----	6,660	20-30	0	----	----	----	----	Contract to KC Co.
	22-16	Gladwin	80	165	----	----	1,470	20-30	0	----	----	----	----	Contract to KC Co.
	22-17	Grand Traverse	440	640	----	----	6,480	20-30	7	----	----	----	----	Contract to KC Co.
	22-18	Houghton	35	25	----	----	360	20-30	0	----	----	----	----	Contract to KC Co.
	22-19	Huron	130	23	----	----	920	20-30	0	----	----	----	----	Contract to KC Co.
20	22-20	Ingham	1,080	930	0	----	14,000	15-25	0	1.58	1.74	----	----	Self
	22-21	Ionia	600	300	----	----	5,400	20-30	0	----	----	----	----	Contract to KC Co.
	22-22	Iosco	465	485	----	----	5,700	20-30	0	----	----	----	----	Contract to KC Co.
	22-23	Iron	22	26	----	----	290	20-30	0	----	----	----	----	Contract to KC Co.
	22-24	Kalamazoo	3,655	0	----	----	21,930	20-30	62	----	----	----	----	Contract to KC Co.
25	22-25	Keweenaw	285	0	----	----	1,710	20-30	0	----	----	----	----	Contract to KC Co.
	22-26	Lake	265	375	----	----	3,840	20-30	0	----	----	----	----	Contract to KC Co.
	22-27	Leelanau	250	520	----	----	4,620	20-30	0	----	----	----	----	Contract to KC Co.
	22-28	Lenawee	600	720	0	----	7,400	20-30	0	1.60	1.65	----	----	Self
	22-29	Luce	47	46	----	----	560	20-30	0	----	----	----	----	Contract to KC Co.
30	22-30	Macomb	10,800	5,700	3,700	----	106,000	20-30	5	1.52	1.70	0.56	----	Self
	22-31	Manistee	90	150	----	----	1,440	20-30	0	----	----	----	----	Contract to KC Co.
	22-32	Marquette	800	395	----	----	7,170	20-30	0	----	----	----	----	Contract to KC Co.
	22-33	Mason	0	0	0	----	0	----	----	----	----	----	----	Contract to KC Co.
	22-34	Mecosta	235	249	----	----	2,900	20-30	0	----	----	----	----	Contract to KC Co.
35	22-35	Menominee	175	156	----	----	1,980	20-30	0	----	----	----	----	Contract to KC Co.
	22-36	Midland	240	127	----	----	2,200	20-30	0	----	----	----	----	Contract to KC Co.
	22-37	Missaukee	325	264	----	----	3,535	20-30	0	----	----	----	----	Contract to KC Co.
	22-38	Montcalm	360	456	----	----	4,900	20-30	0	----	----	----	----	Contract to KC Co.
	22-39	Montmorency	265	265	----	----	3,180	20-30	0	----	----	----	----	Contract to KC Co.
40	22-40	Newaygo	900	1,000	----	----	11,400	20-30	0	----	----	----	----	Contract to KC Co.
	22-41	Ogemaw	288	483	----	----	4,630	20-30	0	----	----	----	----	Contract to KC Co.
	22-42	Otsego	80	126	----	----	1,230	20-30	0	----	----	----	----	Contract to KC Co.
	22-43	Osceola	275	510	----	----	4,710	20-30	0	----	----	----	----	Contract to KC Co.
	22-44	Ottawa	1,500	1,500	----	----	----	20-40	----	----	----	----	----	Self
45	22-45	Presque Isle	310	252	----	----	3,370	20-30	0	----	----	----	----	Contract to KC Co.
	22-46	Roscommon	350	200	----	----	3,300	20-30	0	----	----	----	----	Contract to KC Co.
	22-47	St. Clair	1,800	0	----	----	10,800	20-30	25	----	----	----	----	Contract to KC Co.
	22-48	Tuscola	----	----	----	----	yes	20-30	0	----	----	----	----	Contract
	22-49	Wayne	8,000	6,600	200	390(t)	90,000	20-30	4	1.69	1.71	0.48	----	Self
50	22-50	Wexford	395	586	---- 5,000*	----	5,885	20-30	----	----	----	----	----	Contract to KC Co.
	Totals for State		39,359	28,388	8,900	390(t)	399,235	----	----	----	----	----	----	----

[1] Premixed

NOTE: g = gallons, p = preformed, ft., r = red, w = white, t = thermoplastic, lbs., b = buttons, number.

* applied in some counties by KC Co.

TABLE IV
QUANTITY AND COST OF PAVEMENT MARKING MATERIALS USED BY SOME CITIES IN 1965

No.	State Identification No.	City	Paints, gals				Thermo-plastic, ft	Preformed, Stripe-ft	Buttons, No	Cost of Striping Materials, dollars/unit[3]	Beads, lbs	Approximate Population	Gals white & yellow / 1000 Population
			White	Yellow	Black	Other							
1	5-1	Bakersfield	1,500	600	35	114	----	----	----	2.10, 2.65, 2.48, 3.30	9,000	57,000	36.8
	5-2	Barstow	----	----	----	----	----	----	----	----	----	12,000*	----
	5-3	Burbank	380[1] 1,600	1,170	----	----	----	----	----	3.90[1], 2.34, 2.70	12,500	90,000	35.0
	5-4	Costa Mesa	2,500	1,000	----	----	----	----	----	2.15, 2.30	28,000	44,000	79.5
5	5-5	Fresno	3,900	1,900	200	415	----	----	----	2.33, 2.51, 2.24, 2.94	29,000	135,000	43.0
	5-6	Long Beach	10,700	7,200	----	----	----	----	----	2.16, 2.32	22,000	345,000	51.9
	5-7	Los Angeles	24,000	32,000	8,000	15,000(r)	540,000	----	----	2.25, 2.50, 2.00, 2.65, 0.33	250,000	2,550,000	22.0
	5-8	Monrovia	420	75	----	----	----	----	----	2.25, 2.80	2,500	27,100	18.3
	5-9	Oakland	5,000	4,000	----	600(r)	25,000	----	----	2.19, 2.65, 3.60, 0.33	34,000	368,000	24.4
10	5-10	Oxnard	125	65	2	33(r) 10(g)	----	----	----	2.55, 3.10, 2.64, 4.25(r, g)	----	40,000	4.8
	5-11	Rio Vista	150	----	----	----	----	----	----	----	----	2,600	57.7
	5-12	Salinas	800	300	----	100(r, g)	----	----	----	2.30, 2.45, 2.60	----	29,000	38.0
	5-13	San Diego	12,300	8,760	350	660	----	15,250 5,000(y)	----	2.82, 2.82, 2.48, 4.06, 0.82	86,150	590,000	35.6
	5-14	Santa Barbara	2,400[1]	1,000[1]	----	----	----	----	----	----	----	59,000	57.6
15	5-15	Santa Clara	1,000[1]	1,000[1]	----	200	----	----	----	3.50, 3.50, 3.20	----	59,000	33.9
	5-16	Santa Monica	700[1] 1,800	100[1] 1,400	200	----	10,140	2,040	----	3.79[1], 3.79[1], 2.25, 0.76, 0.21 2.75, 3.10	6,000	83,000	48.2
	13-1	Chicago	40,000[1] 5,000	20,000[1] 2,000	----	----	175,000(w) (y)	----	----	3.85[1], 3.95[1], 0.56 3.60 , 3.70	----	3,550,000	18.9
	19-1	Bangor	400	175	----	----	----	----	----	1.57, 1.70	----	39,000	14.7
	20-1	Baltimore	yes yes[2]	yes yes[2]	yes	----	yes(w) (y)	----	----	2.45 , 2.49 , 3.00, 0.39 3.70[2], 3.70[2]	yes	940,000*	----
20	22-1	Detroit	16,000	3,000	100	----	----	1,800(y)	----	2.05, 2.35, 1.28, 0.15	103,700	1,670,000	11.4
	22-2	Grand Rapids	3,860	2,000	----	----	----	750 100(y)	----	1.72, 1.81, 0.40, 0.20(y)	37,800	178,000	32.9
	22-3	Iron Mountain	60	20	----	----	----	----	----	Contract Striping	----	9,300	8.6
	22-4	Muskegon	900	300	----	----	----	----	----	1.76, 1.87	5,000	47,000	25.5
	22-5	Pontiac	715	585	----	----	----	----	----	1.98, 2.03	3,000	83,000	15.7
25	22-6	Wyandotte	600	50	----	----	675	----	----	1.73, 1.94, 0.75	3,000	46,000	14.1
	32-1	New York	15,000[1] 11,500[2]	24,000[1] 6,900[2]	----	----	1,060,000 241,000(y)	----	----	2.27[1], 2.15[1], 0.263, 4.48[2], 4.48[2], 0.455(y-8")	----	7,800,000	7.4
	35-1	Cleveland	13,000	4,000	----	----	----	----	----	1.63, 1.54	60,000	880,000	19.3
	38-1	Erie	1,200	500	----	----	----	----	----	1.97, 2.35	4,000	140,000	12.1
	43-1	Austin	3,000	3,000	----	----	----	----	9,000 6,000(y)	3.00, 3.00, 0.35, 0.35(y)	36,000	190,000	31.6
30	43-2	Dallas	20,000	4,000	----	----	----	----	427	2.45, 2.91, 3.30	110,000	680,000	35.3
	43-3	Fort Worth	5,000	6,000	----	----	----	----	----	2.75, 3.00	40,000	360,000	30.6
	43-4	Garland	1,500	800	----	----	----	----	100(y)	2.25, 2.60, 3.25	4,000	39,000	59.0
	43-5	Houston	12,000	6,000	----	----	----	----	----	1.78, 2.19	100,000	940,000	19.1
	43-6	San Antonio	1,500	2,000	----	500	----	----	30,000 7,760(y)	2.70, 2.80, 2.75, 0.32	21,000	590,000	5.9
	TOTALS		220,510	145,900	8,887	17,632	2,051,815	24,940	53,287	----	1,234,150	21,720,000*	29.6 Avg.

[1] Premixed
[2] Fast-dry
[3] Covering paints listed from left to right

NOTE: g = green, r = red, w = white, y = yellow

* Not included in population totals

APPENDIXES

Appendix A (Surveys on Usage of Traffic Paints)

1. H.R.B. Circular 347(2), covering 48 State Highway Departments for 1955 gives the following data:

White paint - 2,917,220 gals @ $2.10/gal average cost
Yellow paint - 1,446,980 gals @ $2.50/gal average cost
Other colors - 273,050 gals @ $0.76/gal average cost

The paints were applied at average application rate of 17-18 gal/mile of 4 in. stripe; most of the paint was reflectorized.

2. Sulphur Institute Summary of Highway Marking Practices--47 States--Information for 1961 (unpublished).

White paint - 4,970,412 gals @ $1.90/gal average cost
Yellow paint - 2,296,178 gals @ $2.30/gal average cost
Other colors - 360,864 gals @ - - - - - - - - - - -

Rate of bead application averaged 6 lb/gallon.

3. U. S. Census Bureau, 1963 Census of Manufacturers, Paints and Allied Products and Gum and Wood Chemicals, Industry Statistics, MC63(2)-28E.

1958 - all traffic paint shipped - 6,317,000 gal @ $14,377,000 value
1963 - all traffic paint shipped - 9,075,000 gal @ $19,927,000 value

Appendix B (County Roads in the United States)

1. U. S. Department of Transportation, Highway Statistics/1965, FHWA, BPR. Published April 1967, Table M-1, pp. 140.

1,739,491 miles of all U. S. county roads under local control.
86,803 miles of all Mich. county roads under local control.
70,089 miles of all Calif. county roads under local control.

where $1,739,491/86,803 + 70,089 \cong 11$ (factor) (based on county roads).

HIGHWAY RESEARCH BOARD
QUESTIONNAIRE ON
PAVEMENT MARKING MATERIALS
For Calendar or Fiscal Year of 1965

RETURN QUESTIONNAIRE TO:
A. J. Permoda
HRB Subcommittee MC-D2(3)
Mich. Highway Research Labs
735 E. Saginaw Street
Lansing, Michigan 48926

I. SPECIFICATION: Please check applicable box(es)

A. Specification for paint includes:

◯ Brand Name

◯ Composition requirements; including ◯ % pigment ◯ % vehicle solids ◯ pigment composition ◯ Vehicle composition ◯ Volatile composition

If applicable, check type(s) vehicle specified: ◯ Alkyd, ◯ chlorinated rubber, ◯ dispersion resin, ◯ epoxy, ◯ polyvinyl toluene, ◯ phenolic, ◯ other_____

◯ Tests made under supervision of purchaser: ◯ Road performance, ◯ Laboratory

Certification requirement: ◯ on composition ◯ on physical test properties

B. Specification for beads require: ◯ laboratory test ◯ field performance test

II. QUANTITY & COSTS: Indicate approx. total quantity purchased & unit materials costs for above year in appropriate spaces:

	White	Yellow	Black	Other
A. Paint, premixed with beads, total gallons				
Avg. Cost/gal.,	$	$	$	$
B. Regular paint, total gallons				
Avg. Cost/gal.,	$	$	$	$
C. Hot-applied thermoplastic, total feet				
Avg. Cost/ft. (installed)	$	$	$	$
D. Preformed stripe, total feet				
Avg. Cost/ft. (material only)	$	$	$	$
E. Traffic buttons, number of pieces				
Avg. Cost/piece (material only)	$	$	$	$

	Treated to be Water-resistant		Regular		Other
	High Index	Regular Index	High Index	Regular Index	
F. Total pounds of glass beads					
Avg. Cost/lb.					

III. ROADWAY STRIPING: (a) Portion of total striping in edge lines_____%, lane lines_____%, center lines_____%.
(b) Centerline consists of _____ ft. of stripe and _____ ft. of skip.
(c) Average bead content per gal. of paint in lbs.: premixed only_____, drop-in only_____, combination_____
(d) Average wet film thickness of applied paint was _____mils.

IV. Respondent's Name_____ Respondent's Agency_____

Respondent's Title_____ Respondent's Address_____