SIGN POST PAINT EVALUATION

by

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SUMMARY

After reviewing R. N. Robertson's report on "An Investigation of Streaking on Highway Traffic Signs", the Traffic Research Advisory Committee recommended that an evaluation of sign post paints be conducted. Special attention was to be focused on the residues formed by the sign post paints on the sign panels. The study was to select from the Department's oil base and latex paints, and four other paints supplied by the William Armstrong Smith Company, the one most feasible for use in painting sign posts. The criteria considered were chalking, durability, and appearance.

After 17 months of evaluation, from February 22, 1974, to July 28, 1975, there has been some change in the retroreflective readings on the sign panels and posts. Retroreflective readings and visual observations show that the Department's number 10 oil paint chalked and deteriorated more rapidly than did the latex paints.

It is recommended that the evaluation be extended to allow sufficient weathering of the sign panels and posts for a determination of the more extensive effects of paint residues on the sign panels and a more definite idea of the paint durability.

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INTRODUCTION

Traffic signs are an important part of the highway system in Virginia as they provide guidance and safety for the motorist. For a sign system to be efficient, the signs must be clear and legible. An important factor to consider in maintaining signs is the sign post paint. The report on "An Investigation of Streaking on Highway Traffic Signs",(1) prepared by R. N. Robertson of the Virginia Highway and Transportation Research Council, contained a recommendation that an evaluation of the oil base and latex paints used by the Department be conducted. Upon reviewing Robertson's report, the Traffic Research Advisory Committee agreed that the performance characteristics of sign post paints should be evaluated to determine the paint which chalked less, thereby minimizing the streaks across the sign face. In response to the committee's recommendation, six sign post paints are being evaluated on the basis of visual observations and retroreflective light readings. With aging and weathering, the chalking of the paint leaves a residue upon the sign face which decreases the nighttime retroreflectivity and effectiveness of the traffic sign.

OBJECTIVES

The objectives of the project are to determine the effects of paint residues on the sign panels, which are mounted on wooden posts and are painted with six types of paint, using chalking, light retroreflective readings, and appearance as performance criteria. In addition to the amount of chalking, this project should determine the paint which has the greatest durability and the best appearance.

METHODOLOGY

Preparation of Test Posts and Signs

Six 8-ft. (2.44 m) sign posts were brush painted in accordance with the Department's specifications, with three coats being applied to each post. Two of the paints (latex and number 10 oil) are presently used by the Department. The other four (PL-100, 2-120, M1-223, and 3-100) were supplied by the William Armstrong Smith Company, an independent paint company. Also, sign

panels 12 in. (30.48 cm) wide by 18 in. (45.72 cm) high were mounted 1 ft. (30.48 cm) from the top of the posts as shown in Figure 1. The sign panels were fabricated with green enclosed lens reflective sheeting.

Exposure Site

The painted sign posts with panels attached were placed on the roof of the Virginia Highway and Transportation Research Council building for exposure to weathering.

Performance Evaluation

The chalking and performance characteristics of the paints were evaluated with a reflectometer which gives an indication of the percentage of light reflected from the panel or paint surface. As the paint chalks, the light retroreflective readings on the sign panels are expected to decrease as a result of streaking. Retroreflective readings from the painted posts may prove to be informative concerning the target value of sign posts and in determining the performance characteristics of the paints.

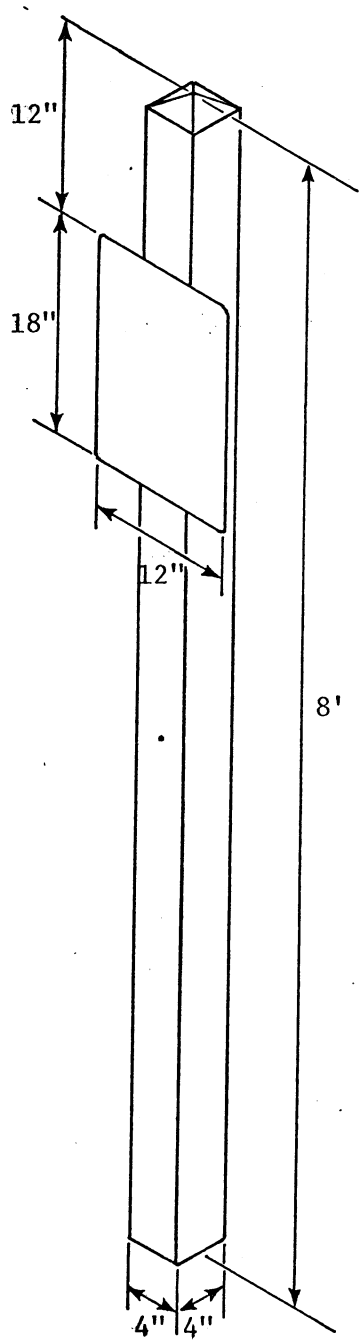
Retroreflective readings were taken at six locations on each test sample (see Figure 2). Four readings were taken on the sign panels and two on each post. Two templates were used to ensure that the monthly readings were taken at the same six locations. A modified Gardner portable reflectometer was used to take the readings. The reflectometer gives a meter reading in percentage of light reflected from a surface. Prior to each month's readings, the reflectometer was calibrated to a white standard reflectance plate to yield a meter reading of 19% at the retroreflection setting of the instrument.

Visual observations were made on a monthly basis. The degree of chalking across the panels and the residue accumulated at the base of the sign posts were recorded. The appearance of the paints was visually evaluated on the basis of glossiness, whiteness, and brightness, rated on a scale of one to six, with one being the glossiest, whitest, and brightest paint. Chalking on the posts was tested by rubbing a hand across the posts and observing the amount of paint on the hand.

ANALYSIS

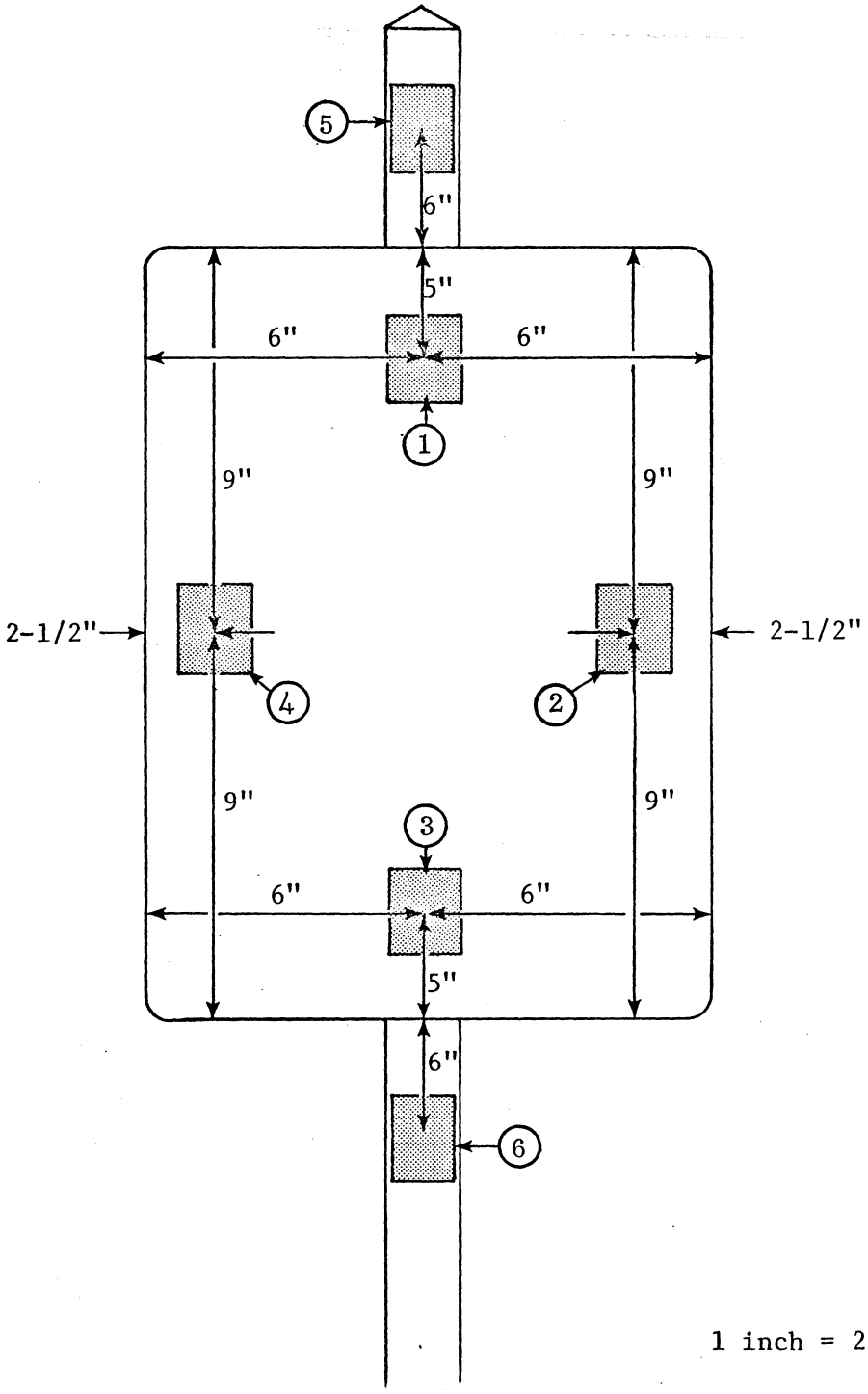
Retroreflective readings were used as a basis for determining the effects of paint residue on the sign panels and to help in evaluating the performance of the paints. R. L. Rizenbergs's report on "High-Intensity Reflective Materials for Signs"[2] provided data on accelerated weathering of green enclosed lens sheeting. The sign panels in Rizenbergs's project were not exposed to any paint residue. The reflectivity of the sign panels decreased 4% over the entire 17-month period in Rizenbergs's study.

Based on the means of the retroreflective readings taken at the beginning of the evaluation of the sign post paints (February 22, 1974) and



1 foot = .3048 meter
1 inch = 2.54 centimeters

Figure 1. Sign panel and post dimensions.



1 inch = 2.54 centimeters

Figure 2. Retroreflective reading locations.

readings taken 17 months later (July 28, 1975), difference of means, percentage difference of means, and difference between the actual percentage and accelerated weathering percentage of change as noted in Rizenbergs's project are shown in Table 1. The number 10 oil paint panel shows the largest percentage change of retroreflectivity based on the accelerated weathering percentage of change. The number 10 oil paint panel's high percentage of change can be attributed to the extensive streaking as a result of chalking paint from the post. The latex panel showed the least amount of retroreflective change after the 17-month period. The latex sign panel has decreased in retroreflectivity only 1% more than the sign panels in Rizenbergs's study, which had no possibility of paint residues affecting their reflectivity. The P1-100, M1-223, and 3-100 panels are within the same range of retroreflectivity decrease. The 2-120 panel has decreased in retroreflectivity a little more than the Department's latex.

The percentage differences of means of retroreflective readings for the 17-month test period were used to evaluate the sign posts. The PL-100 paint had the highest percentage difference of means (20%), which is a result of the mold spots, brown spots and streaks, and gray streaks and tint on the post. The M1-223 and latex posts were close in range and 9% and 7% differences of means, respectively. Both of these posts had brown spots, brown streaks, and mold. The 2-120 and 3-100 experienced approximately the same amount of weathering, 4% difference of means, and both had brown spots and some mold on the posts. The number 10 oil paint weathered, but its percentage difference of means was a minus 3%. This percentage difference can be attributed to the number 10 oil paint's heavy chalking characteristics. As the paint chalks, the dirt and grime on the post come off in the chalking process.

CONCLUSIONS

After 17 months of exposure to weathering, the test posts and signs have all undergone a change in retroreflective readings. All the test sign panels' retroreflective readings have changed more than the sign panels in Rizenbergs's accelerated weather condition. The Department's number 10 oil paint has the most streaked panel and its latex paint has the least streaked panel. The retroreflective readings for all the posts have decreased, except that for the number 10 oil paint, which has increased by 3%. This increase may be the result of the number 10 oil paint's extensive chalking.

Although the determination of the superior sign post paint cannot be made at this time, visual evaluation of the sign panels and posts may provide a basis for speculating as to which paint will be the best after several more months. Visual evaluation based on glossiness, whiteness, and brightness indicates that 3-100 is the best for the 17-month time period, followed by PL-100, number 10 oil paint, M1-223, 2-120, and latex in decreasing glossiness, whiteness, and brightness. Visual observations of the sign panels and posts also indicate other interesting facts. The 3-100 sign post shows no evidence of chalking. The latex's low rating based on glossiness, whiteness, and brightness is a result of the presence of mold everywhere on the post. The number 10 oil paint is chalking heavily and the sign panel is streaked. Cracks have appeared on the post with the number 10 oil paint. These observations indicate that the number 10 oil paint presently used by the Department has several undesirable characteristics.

TABLE 1

SUMMARY OF RETROREFLECTIVE READINGS
(4% Accelerated Weathering Change)

Panels	Means 2/22/74	Means 7/28/75	Difference of Means	% Difference of Means (Actual % Changed)	Difference Between the Actual % and Accelerated Weathering % of Change
PL-100	14.25	12.75	1.50	11%	7%
2-120	13.94	13.00	0.94	7%	3%
M1-223	13.50	12.19	1.31	10%	6%
3-100	13.81	12.25	1.56	11%	7%
Latex	13.25	12.63	0.62	5%	1%
No. 10 Oil Paint	14.00	12.06	1.94	14%	10%
Posts					
PL-100	18.38	14.63	3.75	20%	
2-120	19.75	19.00	0.75	4%	
M1-223	18.00	16.38	1.62	9%	
3-100	17.88	17.25	0.63	4%	
Latex	17.50	16.25	1.25	7%	
No. 10 Oil Paint	15.25	15.75	-0.50	-3%	

RECOMMENDATIONS

Although none of the six sign post paints have failed after 17 months of weathering, the study should be continued for another 19 months (May 1, 1977), after which time more extensive effects of the paint residues on the sign panels can be evaluated. Also with more weathering time, the durability of the paints will be more evident.

Based on visual observations and retroreflective readings on its panel, the Department's number 10 oil paint is the least satisfactory paint to use on sign posts. Further evaluation is needed to make final conclusions on the other five latex paints.

Paint cost, storage, and titanium dioxide percentage are factors which should possibly be considered in the final report to aid in choosing the best paint for the Department's use.

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