

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT

JOHN C. MACKIE, COMMISSIONER

August 12, 1963

To: R. L. Greenman
Assistant Testing and Research Engineer

From: E. A. Finney

Subject: Reflectorized Delineator Posts, Mid-States Steel and Wire Company,
Research Project R-63 NM-86. Report No. 432.

On May 28, 1963, we gave you a preliminary report on the brightness (specific intensity) of two posts whose tops had been reflectorized with a combination of beads and paint. These posts had been submitted to the Committee for Investigation of New Materials by Mr. F. F. Branham for consideration as a possible substitute for our standard delineators and were referred to the Research Laboratory for tests of brightness and weathering resistance. You had already advised Mr. Branham that the reflectorization might not be bright enough under the conditions of high-speed night driving but the Committee would make a decision after receiving a final report from the laboratory.

The work has now been completed by P. J. Chamberlain, who prepared the following report:

"Two tee-section fence posts with reflectorized tips were submitted for testing on May 3, 1963. A two-inch section on the end of each post was reflectorized with beads on gray paint. These tips were sawed off and placed in the weatherometer for twenty-five cycles of accelerated weathering. Specific intensity of the tips was measured before and after weathering.

"Examination after weathering revealed no chipping of the reflectorized surface had occurred. Two very small cracks, probably due to weathering, were found in Sample A.

"Some yellowing of the samples resulted from rusting of exposed metal areas on the samples.

"Data on reflector buttons and reflective sheeting are included for comparison purposes."

	Specific Intensity at $1/3^\circ$ Divergence Angle, cp per ft-c per sq inch	
	Before Weathering	After Weathering
Post Tops,		
63 MR-62A	0.07	0.11
63 MR-62B	0.08	0.14
Stimsonite crystal reflector buttons	7.1	8.0
3M reflective sheeting, silver (regular flat-top)	0.32	0.15

While weathering performance cannot be predicted exactly on the basis of accelerated tests, the general assumption is that 25 cycles of our Weatherometer test are roughly equivalent to one year of outside weathering.

A comparison of the specific intensity values in the table shows that the reflectorized post tops are not of the same order of brightness as either the crystal reflector buttons or the silver sheeting. The buttons are 100 times as bright and the sheeting more than four times as bright. Actually, the reflective sheeting used for comparison in this test had only slightly more than the minimum brightness permitted by our specifications; reflective sheeting for delineators would be four times as bright as this material or approximately 16 to 20 times as bright as the reflectorization on the post.

The reflectorized post tops stood up well in the weathering test, showing a slightly higher brightness at the end of the test than at the beginning. The Stimsonite buttons exhibited the same phenomenon. Increases in brightness such as these often occur in weathering tests of reflective materials and may be caused by removal of film from the surface of reflecting elements or by slight changes in the optical geometry of the reflecting system brought about by distortion of cube corners in the case of reflector buttons or a change in thickness of the resin matrix in reflective sheeting. A marked loss of brightness would, of course, indicate an appreciable loss of beads from a bead-paint system.

To sum up, the reflectorized post tops had good weathering resistance, as measured by exposure to 25 cycles in the Atlas Twin-Arc Weatherometer, but did not possess the brightness considered necessary for night-time delineation on highways where these devices are normally used.

OFFICE OF TESTING AND RESEARCH

E. A. Finney, Director
Research Laboratory Division