

OFFICE MEMORANDUM



MICHIGAN DEPARTMENT OF STATE HIGHWAYS

July 1, 1968

To: L. T. Oehler, Director
Research Laboratory Section

From: A. J. Permoda

Subject: Report on Experimental Raised Traffic Markers on I 75 in Detroit.
Research Project 67 G-159. Research Report No. R-678.

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Experiments with raised markers for centerlining have been conducted since roads in the U. S. became hard surfaced. The crude early versions (as oversized nails) gave way to traffic paint which improved in the service life aspect with the succeeding years. Part of the improvement was due to the development of formulas permitting greater thickness of the applied traffic paints. In the early 1940's, the advent of glass beading gave a further boost to the service life and a big improvement to the night visibility of the paint striping. The evolved developments, such as use of greater thickness and glass beading, were offset costwise by going to a broken centerline which kept the painted stripe reasonably priced.

Increasing traffic on highways, however, made it apparent that the beaded paint stripe was deficient in visibility in the rain, especially under night conditions, and also lacking in service life on heavily travelled urban highways.

A variety of stripings, as correctives for above, again were researched. In the 1950's, California pioneered in experimenting with raised markers about 4 in. wide which got to be called "Botts' Dots," because the principal investigator was E. D. Botts. These finally evolved into domed discs about 4 in. in diameter and 3/4 in. high. They can be beaded or unbeaded. Currently, California uses them in place of striping on its coastal highways. Their 9-ft broken stripe consists of 4 "Dots" on 3-ft centers. Beaded discs replace the unbeaded ones at intervals. California is so satisfied with the improvement of the markings regarding night visibility in the rain, and also service life (upwards of 5 years) that it is experimenting with methods of recessing the Dots in mountainous areas where snowplowing is necessary. Reportedly, the Dots have a bonus safety feature in that the rumble effect discourages lane migration by vehicles.

The above was reviewed and discussed by the Department's Traffic Control Devices Committee at its November 8, 1966 meeting and by the New Materials Committee at its December 15, 1966 meeting. As a result of these reviews,

it was decided to set up a field test for the raised markers as lane markings. The test would be supplemental to the field tests already programmed for the raised markers as special ramp delineators on the Southfield Freeway. The tests were then scheduled for I 75, north of the Rouge Bridge, in the Detroit area where the necessity of snowplowing is generally minimal for the State.

Four proprietary makers were selected for the tests. All were of nominal 4-in. width, all were about 1/2-in. high and were cemented onto the roadway.⁽¹⁾ They were:

1. Borg Warner "Cycolac" White Elastomer, having 6, 1/8 in. cat's eyes in leading edge.
2. Stimsonite Grey Plastic with a plastic cube corner reflex-reflector on leading edge.
3. 3M White Porcelain with two transverse beaded glass tube reflectors mounted on dome top (Fig. 1).
4. Cataphote Catadot beaded white plastic in two types of beading. (These closely resemble Bott's Dots.)

All were installed by Wayne County Road Commission personnel in October-November, 1967 as lane markers before the official opening of the roadway in December; each for a half-mile length of the divided highway. Three lane lines were required for each 4-lane roadway. The markers were generally placed on 4-ft centers to form a 20-ft long broken line, plus the standard length skip. For more details of installation, see "Preliminary Report on Raised Pavement Markers" by the Reflective Devices Unit, Traffic Division, and their movie.

A day and night inspection was made of the installations by subcommittee members R. E. Addy and the writer before the official opening of the roadway. Under night driving, all four were significantly brighter than the standard beaded paint line, with the Stimsonite type the brightest of the raised markers, and the other three ranking about second best. Under day driving, all were rated as slightly poorer in visibility on the concrete roadway than the standard white-black painted line, with the grey Stimsonite giving the poorest delineation. (The raised markers did not have the black paint applied in the 30-ft skips, for supplemental contrast.)

⁽¹⁾ NOTE:

(a) Of the models purchased for test, the last two were essentially bi-directional; the first two, mono-directional.

(b) At about 80 cents per unit, a lane-mile of these markers costs about \$500, without installation, which makes them almost as expensive as the \$700 for applied thermoplastic striping.

Results

Unfortunately, the Detroit area had two significant snowfalls during the Winter, calling for snowplow removal. The first was in mid-January and the second in March. Apparently, no special measures were taken in the test areas during the snow removals to safeguard the markers. Accordingly, each snowplowing removed about one-quarter of the markers and damaged the reflective elements of some of those remaining. Figure 2 shows the appearance after the second snowplowing. More details are presented in "Final Report on Raised Pavement Markers" by the Reflective Devices Unit, Traffic and Safety Division, dated April 30, 1968.

This is unfortunate, since the raised markers during their short stay (less than 4 months, which in this case happened to be the Winter period) never presented the subcommittee with an opportunity to rate them at night under rainy and foggy conditions, nor did they allow noting the effect that possible road grime pick-up during service would have had on lowering the night visibility of the reflective elements.

The tests did confirm three points: (a) day visibility of the light colored markers on concrete could be improved by use of black paint in the skip portion of the line; (b) newly installed raised markers have significantly better night visibility under normal non-rain conditions than our beaded paint line, and (c) a significant ratio of the raised markers is removed and damaged during each snowplowing as conducted in Michigan.

Recommendations

We concur with the Reflective Devices Unit that nothing more can be salvaged from the I 75 field tests, and that they be discontinued.

Since the Department has interest in two inherent features of the raised markers, improved night visibility under all conditions, and improved service life, both contributing to highway safety, we suggest maintaining contact with California and other users concerning their progress in transplanting the raised markers to snowy regions.

TESTING AND RESEARCH DIVISION



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AJP:sjt



Figure 1. Newly installed markers on concrete prepared by grinding; most was blast cleaned. (3M markers on non-standard 3-ft centers, on SB I 75.)

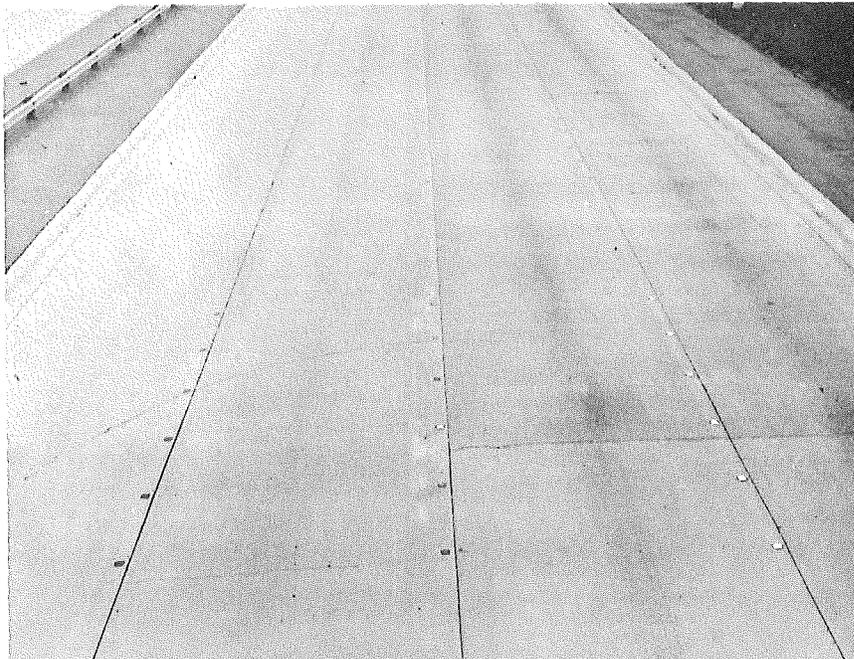


Figure 2. Typical appearance of roadway after second snowplowing. The white dots show presence of markers; the black dots, evidence of removed markers. (Catadot area on southbound I 75.)