



OFFICE MEMORANDUM

DATE: July 2, 1976

TO: L. T. Oehler
Engineer of Research

FROM: A. J. Permoda

SUBJECT: High-Index, Wet-Performance Glass Beads for Pavement Markings
From Potter Brothers.
Research Project 70 NM-270. Research Report No. R-1014.

Potter Brothers, with assistance from the 3M Company, developed subject glass beads, which allegedly impart improved night visibility in the rain to beaded pavement marking stripes. Descriptive information on the development was meager, except to say that the glass beads were high-index (reportedly about 1.55) and were surface treated to be bisymmetric (flotation type).

In 1970, D. R. Strouse of Potter's asked our consent to make a trial installation of the exploratory type. We agreed to that and to serve as observers. Instead of supplying subject beads of the drop-on type, he supplied a 10-ft length of 4-in. plastic, glue-on, white tape, reflectorized with the beads; also equivalent striping reflectorized with standard beads for comparative purposes. Seven-foot lengths of each were applied as lane striping by him in front of the Laboratory on June 10, 1970.

Shortly thereafter, area youngsters pried off about one-fourth of the standard-bead tape. That was cut off, and no further vandalism was noted.

Initial observations during dry weather showed subject high-index beads to provide brighter night visibility than the standard beads, as expected. The few night observations we were able to make in the rain showed that the beads failed to provide the alleged improvement in night visibility under those conditions, though they appeared to become ineffective slower than standard beads after the start of a drizzle, and became effective faster than standard beads after a rain.

For additional information purposes, the test beaded striping (longitudinal) was placed in front of the Laboratory where there are low traffic volumes, so the striping was still in good condition after over five years of service though the glass beads had been mostly weathered out of the plastic base, especially the high-index beads (Fig. 1). The latter may have been due to the surface treatment conferring relatively poorer adhesion.

Conclusions

An inquiry to the Massachusetts Highway Department, who cooperated with the producer by evaluating the beads in their own paint, revealed no noticeable improvement in night visibility in the rain when using subject high-index beads. Since the producer stopped contacting us after our initial report, we deduce that trial field tests with other cooperators also supplied negative results, as did our tests.

Companion Developments

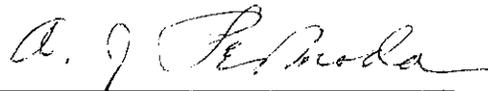
Beaded paint striping loses visibility at night in the rain because the roughish beaded stripe retains a film of water whose smooth surface causes the incident headlight beam to reflect out into space rather than be retro-reflected. A notable, comparatively recent corrective for this deficiency is the raised marker, which in turn has another deficiency; damage and/or removal by snowplows.

Other developments under evaluation by the Department are:

Wet-night acrylic plastic, cube corner, reflectors embedded to be flush with the road surface (joint Battelle Institute - FHWA development). Traffic and Safety Division road tests on southbound US 27 north of St. Johns over 1974-75 showed these to have poor visibility beyond 50 ft in front of a car, and being susceptible to traffic damage.

Snow-Glow composite glass beads are reported under Research Project 72 NM-332 (MDSHT Research Report R-1015).

TESTING AND RESEARCH DIVISION



Supervisor - Materials Research Unit

AJP:bf

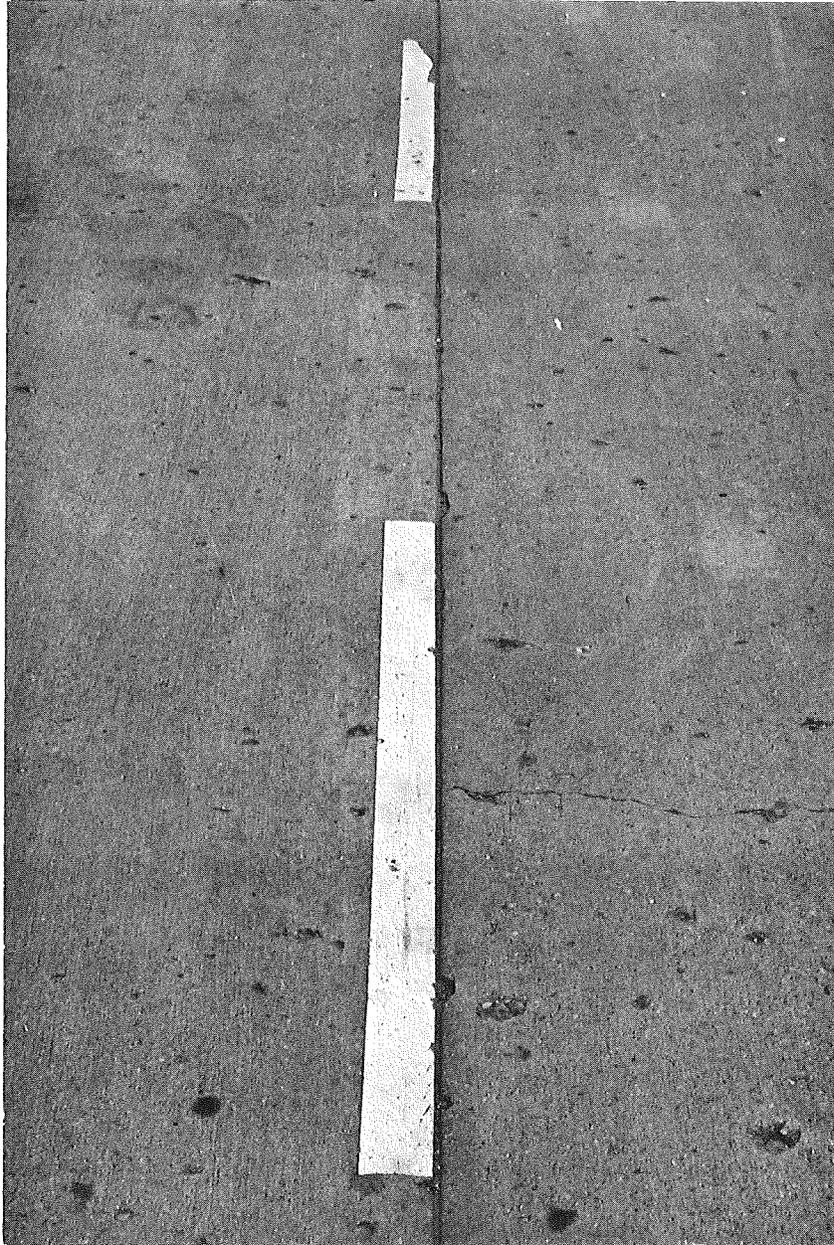


Figure 1. Appearance of beaded test plastic markings in front of the Highway Research Laboratory on high level roadway after over five years of service. Far stripe was shortened by vandals.