OFFICE MEMORANDUM

MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

February 7, 1972

To: L. T. Oehler
Engineer of Research

From: R. C. Mainfort

Subject: "Elastizell" as an insulator for highway bases
Research Project 71 TI-76. Research Report No. R-803

Samples of Elastizell, furnished by Mr. K. A. Allemeier, have been subjected to laboratory testing and a review made of available literature concerning the material. The purpose of this investigation was to determine whether Elastizell could be used in place of Styrofoam as a cold temperature insulation for pavement subgrades.

Elastizell is a liquid foaming agent designed for incorporation into concrete mixes to reduce weight and thermal conductivity. The foam replaces part of the concrete aggregate and the quantity can be varied to produce mixtures of different densities and air contents. It is our understanding that the process is controlled by a European patent, licensed in this country to Prof. L. M. Legatski, Civil Engineering School, University of Michigan and marketed through Elastizell Corporation of America.

The four samples furnished varied considerably in volume and density, were highly water absorptive, and none survived the standard 300 cycle freeze-thaw test used by the laboratory to evaluate cementitious materials. Test results were as follows:

Sample No.	Dry Density[(a)] pcf.	Soaked Water Content[(b)] %	F-T Cycles at Failure[(c)]
1	15.6	140.0	12
2	31.3	36.3	126
3	40.5	39.8	126
4	47.6	33.6	118

(a) Volume determined by measurement to nearest mm.
(b) Measured after 48-hour immersion.
(c) F-T cycles discontinued at 126 when surviving samples indicated incipient failure or large weight loss. F-T results influenced by considerable variation in original sample sizes.

Based on our laboratory tests, and supplementary information furnished by engineers of the Dow Chemical Company, the following conclusions concerning Elastizell are presented:

1. Neither from a structural nor thermal insulating standpoint can Elastizell be recommended as a substitute for Styrofoam. Based on data shown on page 4 of the Elastizell literature (attached), to even approach the insulating value of Styrofoam (K value 0.21-0.23) the density of Elastizell would have to be so low that its structural strength and resistance to freeze-thaw cycles would be highly questionable for practical field use.

2. Unlike Styrofoam, Elastizell is not water repellent so that at the required low density there is no resistance to high water absorption (140% in our tests at a 15.6 pcf density) with subsequent lack of resistance to loading and weathering.

3. To obtain a structurally sound material for highway use the density of the Elastizell mixture must be so high that its insulating properties are reduced to the point where required thicknesses must be increased to a probable uneconomical level.

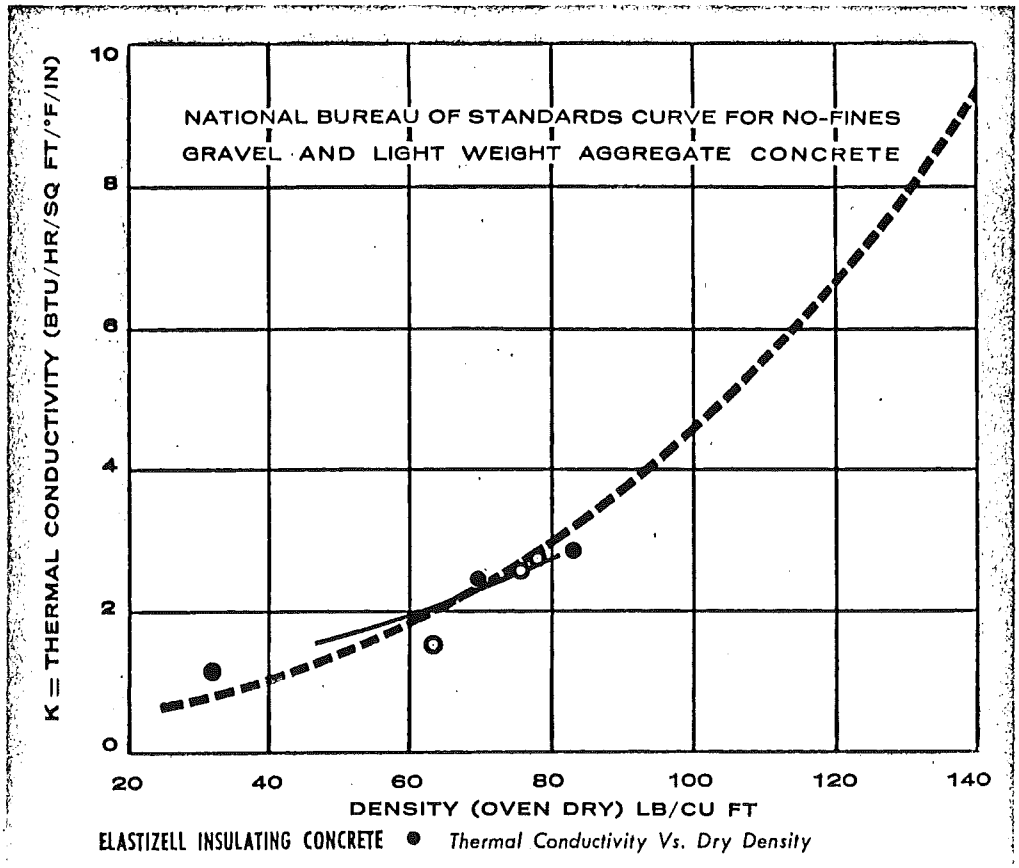
4. Elastizell mixtures are usually prepared at the job site in portable equipment. Control of the resultant formulation has been difficult to maintain with correspondingly wide variation in density and thermal properties.

For its advertised uses, Elastizell, is probably a satisfactory product. It does not appear to be suitable as a substitute for Styrofoam in highway pavement construction. Until such time as meaningful data may be submitted to the Department to show otherwise, it is recommended that no further consideration be given to its use as a subgrade insulator in highway construction.

TESTING AND RESEARCH DIVISION

Supervising Engineer - Soils and
Aggregates Unit

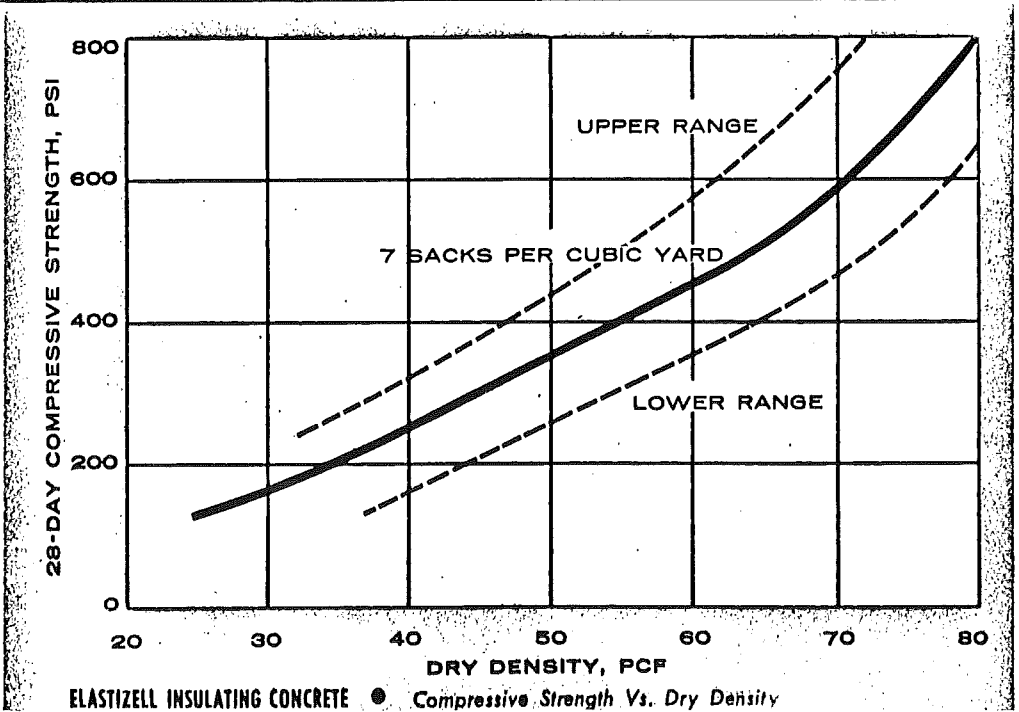
RCM:cgc
Attachment



ELASTIZELL INSULATING CONCRETE ● *Thermal Conductivity Vs. Dry Density*

ELASTIZELL INSULATING CONCRETE

DRY DENSITY (pcf)	28-DAY COMPRESSIVE STRENGTH (f'_c) psi	THERMAL CONDUCTIVITY, (K) (BTU/hr./sq. ft./°F/in.)
20	100	.4
30	150	.7
40	250	1.1
50	350	1.4
60	450	1.8
70	580	2.3
80	800	2.9



ELASTIZELL INSULATING CONCRETE ● *Compressive Strength Vs. Dry Density*

Photos show how Elastizell concrete is used as an insulating material. Left, concrete is poured around an under slab heating duct. Right, pumping two-and-a half-inch pour of low density highly insulating Elastizell cellular concrete roof fill