Pavement Blowups Correlated With Source of Coarse Aggregate

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Synopsis*

This paper reports, in part, the results of a study of the performance of 3,300 miles (78%) of rigid pavements constructed in Indiana from 1921 to 1943. This work was done by the staff of the Joint Highway Research Project, Purdue University, for and in co-operation with the State Highway Commission of Indiana.

The data were obtained primarily from field-performance surveys made over a period of some two years, together with construction and materials records obtained from the Construction and Testing Departments of the Commission and from blowup reports obtained from the Maintenance Department. Those data pertaining to the influence of materials on the performance of pavements—particularly data indicating a correlation between coarse aggregate and blowups—are included in this report. Additional data covering other features have been reported previously or are still being analyzed. Furthermore, since expansion joints were not employed, generally, in the design of pavements in Indiana until 1935 and after, and since the susceptibility of a pavement to blowing up is not generally indicated until the pavement is from seven to ten years old, the data herein reported are confined largely to the 2,623 miles of pavements constructed between the years of 1921-1935 which are still in service.

In analyzing the data it was found that 2,404 blowups occurred in the 2,623 miles without expansion joints and that 851 miles contained no blowups, while 1,715 miles (65%) constructed from 82 coarse aggregate sources contained a total of only 203 blowups. In contrast,

* Reprints of the complete paper, which appeared in the *Highway Research Board Proceedings, 1946,* may be secured from the Joint Highway Research Project, Purdue University. Since it has been printed already, we are omitting it here in the interest of economy.

1,188 blowups were found in 284 miles of pavements constructed with coarse aggregates from only five different sources. Furthermore, 97.1 miles of pavement constructed with material from one of these sources contained 707 blowups (29.4 percent of the total blowups in the state). These data were considered important, since it was observed generally that map cracking, serious disintegration, and a relatively short pavement life accompanied the blowup failures.

It was concluded, on the basis of a statistical analysis of these blowup data, that:

(1) An outstanding correlation existed between certain coarse aggregates used in the concrete mix and the blowup performance of the pavements.

(2) No correlation existed between the cement, fine aggregate, traffic, or subgrade soils used and the blowup performance.

(3) Extensive laboratory research is indicated to determine the basic reason for the variation in performance between aggregate sources and to develop new and better methods of tests by which those aggregates which produce concrete of an unsatisfactory quality can be identified before they are incorporated in the concrete pavement.