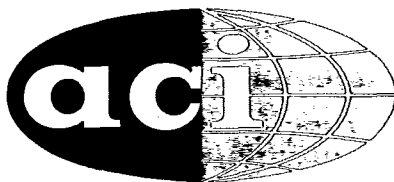


ACI 325.1R-67

Design of Concrete Overlays for Pavements

Reported by Subcommittee VIII,
ACI Committee 325



american concrete institute

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This report up-dates the 1958 report and presents further information on bonded concrete resurfacing. Consideration is also given to concrete overlays on flexible pavements. Design procedures which will give dependable results in situations evaluated by mature engineering judgment are presented; however, note is made that they are subject to further refinement.

Keywords: bond (reinforced concrete); concrete pavements; concretes; continuously reinforced concrete pavements; highways; joints; maintenance; overlay; pavements; pavements (airport); reinforced concrete; reinforcement; resurfacing; soil mechanics; structural design.

INTRODUCTION

Subcommittee VIII reported on the design of concrete overlays in the ACI JOURNAL of September 1958. The purpose at this time will be to update the 1958 report. In addition, further information is given on bonded concrete resurfacing and the consideration of concrete overlays built on flexible pavements is included.

CONCRETE OVERLAYS FOR RIGID PAVEMENTS

General

The 1958 subcommittee report dealt with overlays designed to strengthen and/or upgrade an existing concrete pavement. Consideration was given to the requirements of overlay slabs placed directly on the existing pavement and to the effect of separation courses between the old and new slabs. Although this report will make no substantial change in design procedures, they will be reviewed here to bring together all the pertinent data.

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Overlay slab thickness (partially bonded and unbonded overlays)

For many years concrete resurfacing courses were designed on the assumption that the strength of the two slabs is equal to that of a single slab having a thickness equal to the square root of the sum of the squares of the pavement and resurfacing:

$$T = \sqrt{T_r^2 + T_e^2} \quad (1)$$

where

T = thickness of required single slab, in.

T_r = thickness of resurfacing, in.

T_e = thickness of existing slab, in.

or

$$T_r = \sqrt{T^2 - T_e^2}$$

Traffic tests on overlay pavements placed directly on existing slabs have provided evidence that this formula will yield thicknesses that are very conservative. The U.S. Army Corps of Engineers, which has conducted more tests on overlay pavements than any other agency, makes this comment regarding the formula in Appendix II to its Rigid Pavement Design Manual:¹

"The results of the traffic testing at Lockbourne No. 1 and No. 2 and Sharonville No. 2 indicated that the above relationship was approximately correct when a leveling course, cushion course or bond-breaking course was placed between the two slabs, and that the relationship was too conservative when the overlay was placed directly on the base slab without purposely destroying the bond between the slabs."

If no special steps are taken to prevent bond between the resurfacing and the underlying pavement, the two slabs will act to some degree as an integral unit rather than independently as assumed in Eq. (1). Based on its testing, the