

# **Abdelzاهر Ezzeldeen Ahmed Mostafa**

## Thesis

The Stripping Susceptibility of Airfield Asphalt Mixes: The Development of Guidelines for a Laboratory Test Method

## Abstract

Moisture induced damage (stripping) is defined as the deterioration of a pavement mixture by loss of the adhesive bond between the asphalt binder and the aggregate surface and/or loss of cohesion within the binder primarily due to the action of water. Stripping causes the disruption of mix integrity, which reduces the life cycle by accelerating all distress modes including rutting, fatigue cracking, raveling, potholes, and flushing.

An extensive literature review has been carried out to identify the main factors leading to moisture-induced damage. Despite the fact that airfield mixes are exposed to the same types of distresses and environmental conditions, the literature shows that most of the research to date is focused on highway asphalt pavements and that it almost ignored the unique characteristics of the airfield asphalt pavements. Moreover, the test methods that are currently used to evaluate stripping in the laboratory showed a lack of correlation to field performance. Therefore, the main objective of this research is to develop guidelines for a laboratory test method that considers the unique characteristics of asphalt mixes used for airfield facilities and to correlate laboratory results to the field performance. In addition, this study examines the relationship between permeability of asphalt surface and stripping characteristics of the mix.

To achieve the objectives of this research, the research plan started by evaluating four major standard test methods, which are currently used to evaluate stripping. The experimental program proceeded by investigating the main factors that affect the evaluation of stripping such as: construction cracks, air voids content, environmental factors, and conditioning duration. In addition, the experimental program investigates the use of field permeability as a non-destructive test to evaluate the quality of the laid asphalt pavement in terms of susceptibility of stripping.

Statistical analysis of the test data was performed to examine the significance of the results and to determine a relationship between permeability and stripping characteristics. Finally, the main features of the guidelines for a more reliable test method are proposed and presented. The method was verified using field and laboratory test samples, and preliminary critical permeability limits were determined. This thesis provides the pavement industry and airfield authorities with consistent and more reliable guidelines for a laboratory test method and a non-destructive field test to control and evaluate the susceptibility of airfield mixes to stripping.

## Degree

Ph.D.

## Completion

2005

## Supervisors

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