

Thesis Title	Design of Flexible Pavement Structure By Rational Method Using DAMA Program	
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### Abstract

The Thai Department of Highways ( DOH ) adopts the Asphalt Institute pavement design method , 8<sup>th</sup> edition as the code of practice for the design of flexible pavement. This method is empirical and was developed uniquely for the design of a full depth asphalt pavement ( Pavement consists of asphalt concrete layer laying on soil subgrade ). A design of conventional layered pavement can be obtained, however by converting the thickness of asphalt concrete to that of other materials using the factors called layer equivalent factor. It is generally understood that an empirical method has some limitations since it was developed mainly from results of experiments and under particular conditions such as the condition of temperature, moisture and soil type. The use of layer equivalent factor in dimensioning the layered pavement poses also some doubt since no consideration is given to the stress and strain developed in the pavement structure. It is believed that if a rational design method is employed, all limitations could be alleviated.

This study employs the computer program DAMA, developed from the rational method proposed by The Asphalt Institute USA., to analyze the behaviour of a pavement structure for the purpose of using the program as a design tool. From a parametric study, it is found that a thin asphalt surfacing ( 2 inch ) gives a longer service life than a thick surfacing ( 4 inch ) when considering surface cracking as a failure criteria. However service life increases for surfacings thicker than 4 inches. Analysis of the DOH existing pavement structure on 16 routes reveals that most

failure would occur in the underlying subbase or subgrade layer. This type of failure is undesirable for the maintenance and overlay work.

A comparison has been made between the designed thickness obtained from program DAMA, from The Asphalt Institute empirical method, 8<sup>th</sup> edition and from the HDM - 3 method proposed by consultant N.D LEA INTERNATIONAL LTD 1992. It is found that program DAMA gives the result close to that of The Asphalt Institute 8<sup>th</sup> edition ( for the cumulative standard axle less than 6,000,000 repetition, DAMA suggests thinner pavement, for repetition higher than 6,000,000 , DAMA give thicker pavement ). The result of program DAMA is also in agreement with the result of HDM - 3 for the good maintenance strategy. A design chart for a full-depth asphalt pavement is prepared, using program DAMA , for the conditions of Thailand.

An attempt has been made to produce a designed guide for a 4 and 5 layered pavement in terms of designed categories as shown in table 5.8 and 5.14. The principle in dimensioning the thickness of each layer for each category is that the pavement would be controlled to have failure only at the surfacing for the benefit and ease of maintenance and overlay work. The suggested designed categories are then used to design a pavement structure using typical design data and the result compared with that obtained from the current DOH method. The results show that the designed categories gave thinner pavement.

The program DAMA is also modified by adding a routine to compute the modulus of existing pavement and subgrade layer from the data of the deflection measurement. The thickness of an overlay can be designed by following steps as in designing a new pavement.