

UNIVERSITY OF MORATUWA

**IMPROVEMENTS IN DESIGN AND CONSTRUCTION
STANDARDS OF SURFACE DRESSINGS FOR NATIONAL
ROADS IN SRI LANKA**

BY

H.L.D.M.A. JUDITH



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**DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF MORATUWA
SRI LANKA**

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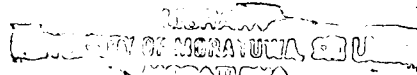


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ROADS IN SRI LANKA**



BY

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B.Sc. Eng., M.Eng., CEng., MIE(SL)

**THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN
HIGHWAY AND TRAFFIC ENGINEERING**



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SRI LANKA

um Thesis

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University of Moratuwa



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To
my husband, Nimal
and
daughter, Samali



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ABSTRACT

Surface dressing is a well-established, economical and effective method for maintaining the surface of roads. The object of surface treatment is to seal the existing road surface and to arrest disintegration of the road as well as to provide a comfortable surface to its users. In Sri Lanka most of the periodic maintenance of roads is done by using one of the surface dressings; sand sealing, single bitumen surface treatment (SBST) or double bitumen surface treatment (DBST).

However, premature failures in the form of stripping of aggregate, flushing of the surface, peeling off, patches, cracks and streaking along the surface are some of the problems that predominate in most of the local roads that are surfaced using SBST and DBST. As a result of these failures road maintenance cost increases and also cause inconveniences to the road users. Some attempts have been made over many years to minimize the above-mentioned defects and increase the life of surface dressings. However, economical and significant improvements have not been established.

This research concentrates on developing improved standards for surface dressings that includes selection of material, application rates and necessary quality controlling which should be done in the laboratory and in the construction sites. This study focused on identifying the specific factors that will contribute to the failure of SBST and DBST from the design stage up to the construction stage.

The properties of emulsions used for surface dressings were analysed using samples collected at the manufacturing units and construction sites. It was found that viscosity, of emulsion need to be improved and mix proportions need careful adjustments to achieve better results.

A locally available, less expensive modifier and adhesive promoter were identified to improve the quality of the emulsion used for surface dressings. This modifier can incorporate to emulsion easily without any additional effort even at the construction sites.

A formula to determine the rate of binder that suit the condition of the road surface and to the expected traffic level was derived depending on the percentage of bitumen in emulsion and the size of the aggregates used for different layers are known.

Some new testing equipment that is economical and could be locally produced was devised to monitor the material properties and rate of applications at the construction sites. Field performance study using test sections was also done in order measure the effectiveness of the research findings. Finally an economic evaluation was also carried out to identify the benefits of the improvements proposed.

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