MODELING OF INTERFACE BONDING OF BITUMINOUS PAVEMENT LAYERS FOR TROPICAL CLIMATE

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DECLARATION

"I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

The bonding strength of bituminous layers is an element of paramount consequence, as it defines the structural performance of flexible pavement layers. Failure to establish the required strength will lead to the occurrence of pavement distresses.

This study was conducted in pursuance of the aims of identifying and further analyzing the significant parameters affecting interface bonding strength. Type of tack coat, application rate and residual application rate of tack coat, curing time, and surface macro-texture were determined as the parameters, upon the examination of past studies. Another parameter which had not been subjected to prior examination- the absorbed emulsion content was also discovered. Furthering the research, correlations of these parameters were studied based on field data and laboratory data.

Field data were collected from in situ tests, namely the sand patch test and test methods which estimate rate of application, and the absorbed emulsion content test, conducted on actual road construction projects, while laboratory data comprised of interface shear strength of pavement core samples which were evaluated through the Moratuwa Interface Shear Strength Tester (MISST): a device that had been designed in line with the research especially for the purpose of evaluating interface shear strength of pavement core samples.

Established on the observations, a final model capable of evaluating interface shear strength of bituminous pavement layers was developed based on application rate determined by geotextile pads and corrected absorbed emulsion content computed through a past study: significant parameters affecting interface shear strength. It was thus observed that interface shear strength increases when the application rate estimated by the geotextile pads decreases, and when the corrected absorbed emulsion content increases.

Key words: Interface shear strength, Surface macro-texture, Absorbed emulsion content, Application rate

DEDICATION

I dedicate my thesis to my mother and father for nursing me with affection and love and their dedicated partnership for the success in my life

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AC-XX	Bitumen (Viscosity grade)
AEC	Absorbed emulsion content
ARG	Application rate by geotextile pad
ART	Application rate by tray test
CMS-2	Cationic medium-setting, high viscous bitumen
CRS-1	Cationic rapid-setting, low viscous bitumen
CRS-2	Cationic rapid-setting, high viscous bitumen
ISS	Interface Shear Strength
MC-XX	Medium Curing, XX-Kinematic viscosity at 60C in centistokes
MISST	Moratuwa Interface Shear Strength Tester
CAE	New absorbed emulsion content
PG XX-YY	Performance Grade (PG), XX - average seven day maximum pavement design temperature, YY - minimum pavement design temperature
RAR	Residual application rate
RC-XX	Rapid Curing, XX-Kinematic viscosity at 60C in centistokes
SBS	Styrene–Butadiene–Styrene
SC-XX	Slow Curing, XX-Kinematic viscosity at 60C in centistokes
SMT	Surface macro-texture
SS-1	Anionic slow-setting, low viscous bitumen