ANALYSIS OF AIR VOID VARIATIONS WITH TRAFFIC IN HOT MIX ASPHALT WEARING COURSE MIXTURES USED IN SRI LANKAN ROADS – A CASE STUDY

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Declaration of the candidate and supervisor

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ABSTRACT

Over the past decades, road construction with hot mix asphalt (HMA) has significantly increased. However, many issues have risen with respect to the durability of recently constructed asphalt concrete roads. Therefore, the importance of introducing new quality control measures is a current concern.

Properties of the asphalt mixture and the construction practices are important criteria for quality and durability of asphalt pavements. Present Sri Lankan practice is to measure and control, (1) Thickness, (2) Density, (3) Bitumen content and aggregate gradation, and (4) Roughness index (IRI) of the laid asphalt mat.

Objective of the present research is to find the importance of measuring air void of the laid asphalt mat and the need of a combined index of significant parameters to improve quality and durability of asphalt concrete roads.

Core samples were tested at 12 locations with various initial compaction levels at two aging levels, as 100 days and 225 days. In addition, performance of road sections was evaluated with various levels of initial compaction after 5 years to check the long-term aging of asphalt concrete. It revealed that initial air void content decreased significantly under traffic in a short period and it is not possible to evaluate the long-term performance of HMA roads by initial air void content alone.

Key words: *Air voids, Marshall density, Degree of compaction*

DEDICATION

This research study is dedicated to my wife Shamalee, my son Thejana, and my daughter Sithuli.

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LIST OF ABBREVIATIONS

Wherever the following abbreviations of titles, terms, and units of measurement are used in the Specifications or on the Drawings, the intent and meaning shall be interpreted as described hereunder.

HMA- Hot Mix Asphalt

CMA- Cold Mix Asphalt

GTM- Gyratory Testing Machine

VFA- Voids Filled with Asphalt

VMA- Voids in the mineral aggregate

ESAL-Equivalent Single Axle Load

ASTM-American Society for Testing and Materials [an international standards organization that develops and publishes voluntary consensus technical standards]