

**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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Science

Department of Civil Engineering

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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.



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**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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## TABLE OF CONTENTS

ABSTRACT .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENTS .....	iii
TABLE OF CONTENTS .....	iv
LIST OF FIGURES .....	vi
LIST OF TABLES .....	viii
LIST OF ABBREVIATIONS .....	ix
CHAPTER 1: INTRODUCTION .....	1
1.1 Introduction .....	1
1.2 Research Objective .....	2
CHAPTER 2: LITERATURE REVIEW .....	3
2.1 Hot Mix Asphalt (HMA) .....	3
2.2 Cold Mix Asphalt (CMA) .....	5
2.3 Volumetric of HMA .....	5
2.4 Air voids - $V_a$ .....	6
2.5 Voids Filled with Asphalt (VFA) .....	6
2.6 Voids in the Mineral Aggregate (VMA) .....	8
2.7 Aggregate Gradation .....	9
2.8 Binder Content .....	9
2.9 Mat Density .....	11
2.10 Air Voids .....	12
2.11 HMA Compaction .....	14
2.12 Effect on the Compaction Process .....	20
2.13 Common Failures in HMA Roads .....	24
2.13.1 Alligator Cracking .....	24
2.13.2 Block Cracking .....	25
2.13.3 Longitudinal (Linear) Cracking .....	26

2.13.4 Transverse Cracking .....	26
2.13.5 Edge Cracks .....	27
2.13.6 Joint Reflection Cracks .....	27
2.13.7 Slippage Cracks .....	28
2.13.8 Pot Holes .....	28
2.13.9 Depressions .....	29
2.13.10 Rutting .....	29
2.13.11 Shoving .....	30
2.13.12 Raveling .....	31
2.13.13 Bleeding .....	31
CHAPTER 3: EXPERIMENTAL PROCEDURE .....	33
3.1 Methodology .....	33
3.1.1 Literature Review .....	33
3.1.2 QA/ QC Practices in HMA Projects .....	33
3.2 Flow Chart of the Experimental Procedure .....	37
CHAPTER 4: DATA ANALYSIS .....	44
4.1 Degree of Compaction vs. Air Void Content .....	44
CHAPTER 5: CONCLUSION .....	52
CHAPTER 6: DISCUSSION .....	53
REFERENCES .....	56
APPENDICES .....	57
APPENDIX - A. Core Sample Data .....	58
APPENDIX - B. Core Sample Data in 12 Selected Locations - Road A .....	61
APPENDIX - C. Core Sample Data - After 100 Days - Road A .....	62
APPENDIX - D. Core Sample Data - After 225 Days - Road A .....	63
APPENDIX - E. Core Sample Data - After 2050 Days - Road B .....	64
APPENDIX - F. HMA Mix Design Report of Road A .....	65
APPENDIX - G. HMA Mix Design Report of Road B .....	79

## LIST OF FIGURES

Figure 2-1: Composition of HMA .....	3
Figure 2-2: Laying of HMA (original in colour) .....	4
Figure 2-3: Volumetric phase diagram of a compacted HMA.....	5
Figure 2-4: Establishing a roller pattern using a test strip .....	14
Figure 2-5: HMA compaction (original in colour) .....	15
Figure 2-6: Initial compaction with the finisher .....	22
Figure 2-7: Static compaction .....	23
Figure 2-8: Compacting by pneumatic tired roller.....	23
Figure 2-9: Vibratory compaction.....	23
Figure 2-10: Alligator cracking (original in colour) .....	25
Figure 2-11: Block cracking (original in colour) .....	25
Figure 2-12: Longitudinal (linear) cracking (original in colour) .....	26
Figure 2-13: Transverse cracking (original in colour) .....	26
Figure 2-14: Edge cracks (original in colour) .....	27
Figure 2-15: Joint reflection cracks (original in colour) .....	27
Figure 2-16: Shippage cracks (original in colour) .....	28
Figure 2-17: Pot holes (original in colour).....	28
Figure 2-18: Depression (original in colour) .....	29
Figure 2-19: Rutting (original in colour) .....	30
Figure 2-20: Shoving (original in colour) .....	30
Figure 2-21: Raveling (original in colour).....	31
Figure 2-22: Bleeding (original in colour).....	31
Figure 3-1: Flow chart of the experimental procedure.....	37
Figure 3-2: Asphalt laying on top of the complete base course (original in colour) .	38
Figure 3-3: Core sample taking before open to traffic (original in colour) .....	38
Figure 3-4: Obtain mass of dry completed sample (original in colour).....	39
Figure 3-5: Place the core sample here (original in colour).....	39
Figure 3-6: Obtain mass of the specimen in SSD condition (original in colour).....	39
Figure 3-7: Core sample taking after 100 days and 225 days (original in colour) ....	40
Figure 3-8: Core locations of road A .....	41



Figure 3-9: Laying of asphalt on a road which has HMA over lay 5 years before (original in colour) .....	42
Figure 3-10: Asphalt laying records.....	42
Figure 3-11: Obtaining core samples from road B (original in colour) .....	43
Figure 3-12: Measuring the thickness of core sample (original in colour) .....	43
Figure 4-1: Degree of compaction vs. percentage air voids – Data of both roads A& B .....	44
Figure 4-2: Degree of compaction vary with the time - Road A .....	45
Figure 4-3: Degree of compaction vary with the time - Roads A and B together .....	46
Figure 4-4: Air void content vary with the time - Road A.....	47
Figure 4-5: Air void content vary with the time - Roads A and B together.....	48



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## LIST OF TABLES

Table 2-1: Effect of compaction of pavement performance (after R.N. Linden et al.) .....	13
Table 3-1: Aggregate properties .....	34
Table 3-2: Aggregate grading, binder content, and thickness requirement .....	35
Table 3-3: Permissible variations from job mix formula .....	36
Table 4-1: Degree of compaction - Road A .....	45
Table 4-2: Degree of compaction - Roads A and B together .....	46
Table 4-3: Air void content - Road A .....	47
Table 4-4: Air void content - Roads A and B together .....	48
Table 4-5: Performance of road A after 100 days open to traffic .....	49
Table 4-6: Performance of the road 'A' after 225 days open to traffic.....	50
Table 4-7: Performance of road 'B' after 2050 days open to traffic.....	51



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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- Gyrotory 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]



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