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APPLICATION OF ROLLER COMPACTED CONCRETE FOR ROAD PAVEMENTS IN SRI LANKA

By
T.C Ekneligoda

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DECLARATION

I herewith declare that the work included in the thesis in part or whole, has not been submitted for any other academic qualification at any institution.

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.....
Date

Thunha
.....
T.C Ekneligoda

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Date

UOM Verified Signature

.....
Dr. S.M.A. Nanayakkara
Supervisor



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ABSTRACT

There is a great need to construct more durable roads such as concrete roads in Sri Lanka since the government is spending a considerable amount of money every year to maintain the national road network which has been constructed using with either conventional asphalt concrete or bituminous paving materials. This research was carried out mainly to explore the possibility of introducing more durable and cost effective Roller Compacted Concrete for road pavements in Sri Lanka.

The structural behavior of Roller Compacted Concrete pavement (RCCP), which is a rigid pavement, is completely different from conventional asphalt pavements which are designed as flexible pavements. Since RCCP is not currently used in Sri Lanka there is no local standards available for design and construction of RCCP. An extensive literature review was carried out regarding the design of rigid pavements practiced in other countries. The rigid pavements can be designed using different types of design methods for given conditions. However, out of those methods, American Association of State Highway Traffic Organization method (AASHTO) and Portland Cement Association (PCA) method are popular in the countries where rigid pavements are used. Out of these two methods AASHTO method uses more parameters in designing the pavement thickness. Therefore, parametric study was carried out to investigate the effect of each parameter used in AASHTO method. And also a computer program was developed based on PCA method to carry out the thickness design procedure effectively, as it is more suitable for low volume traffic conditions.

An experimental investigation was carried out to formulate a mix design procedure for RCC using local materials. Since the thickness of RCCP depends on the flexural strength of RCC, tests were carried out to investigate the factors affecting the flexural strength of RCC and also other properties such as wet density, compressive strength and drying shrinkage. New test methods were developed to measure these properties specially the flexural strength and wet density incorporating actual conditions of RCC such as actions of static and vibrating rollers. A new apparatus was developed to measure the wet density by modifying the conventional V-B apparatus where vibration as well as known static pressure can be applied to compact concrete. Furthermore, use of chemical and mineral admixtures to improve the properties of RCC was also investigated. Based on the results of experimental investigations a mix design procedure for RCC was proposed.

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CONTENTS

Declaration	i
Abstract	ii
Acknowledgement	iii
List of tables	vii
List of figures	ix
1.0 Introduction	
1.1 Background	2
1.2 Objectives	3
1.3 Guide to thesis	3
2.0 Methodology of study	
2.1 Introduction	7
2.2 Literature survey	7
2.3 Experimental investigation	7
2.4 Design of rigid pavement	7
2.5 Construction of RCC Pavements	7
2.6 Life cycle cost comparison	8
3.0 Literature Review	
3.1 Introduction	10
3.1.1 Design of rigid pavements	10
3.1.2 General information on Roller Compacted Concrete	11
4.0 Roller Compacted Concrete and current practice of mix design	
4.1 Introduction to Roller Compacted Concrete	17
4.2 Current practice of mix design of Roller Compacted Concrete	22
4.3 Concluding Remarks	25
5.0 Experimental investigation	
5.1 Introduction	28
5.2 Determination of suitable aggregate grading for coarse aggregate	29
5.2.1 Introduction	29
5.2.2 Determination of fine aggregate to coarse aggregate ratio	31
5.3 Determination of properties of RCC	34
5.3.1 Introduction	34
5.3.2 Wet density	36
5.3.3 Air Content	38

5.3.4	Flexural Strength	39
5.4	Proposed mix design method for 20mm aggregate size	42
5.5	Use of aggregate for ABC and 37.5mm aggregate in producing RCC	44
5.5.1	ABC	44
5.5.2	Use of 37.5mm graded aggregate	45
5.5.2	Use of 37.5mm graded aggregate	47
5.6	Effect of fly and on Roller Compacted Concrete	49
5.6.1	Introduction to fly ash	49
5.6.2	Test carried out with pulverized fly ash	50
5.7	Roller Compacted Concrete with admixture	52
5.7.1	Introduction to admixture	52
5.8	Shrinkage of Roller Compacted Concrete	55
5.8.1	Introduction to shrinkage	55
5.8.2	Spacing of movement joints	57
5.8.3	Measurement of shrinkage	57
5.8.4	Results and discussion	58
5.9	Compressive strength of RCC	64
5.9.1	Introduction	64
5.9.2	Test Results	65
5.10	Conclusions	66
6.0	Design of rigid pavements	
6.1	Introduction	70
6.2	Structural analysis of pavements	70
6.3	Analytical solutions	71
6.3.1	Introduction	71
6.3.2	Parametric study	74
6.3.2	Concluding remarks	77
6.4	Organizational methods	78
6.4.1	PCA method	78
6.4.2	Simplified PCA design procedure	87
6.4.3	American Association of state highway and Transportation officials method	93
6.4.4	Simplified AASHTO method	100
6.4.5	Thickness design procedure used in France	103
6.4.6	Thickness design procedure used in South Africa	105
6.5	Joint design n concrete pavement	111
6.5.1	Effect of sub base friction	112



6.5.2	Joint opening	113
6.5.3	Design of tie bars	114
6.5.3	Design of dowel bars in the joints	114
6.6	The computer programme	122
6.6.1	Objectives of the programme	122
6.6.2	User guide	125
6.7	Concluding remarks	131
7.0	Introduction to rigid pavement construction	
7.1	Introduction to pavement types	134
7.2	Concrete pavements (Rigid pavements)	135
7.2.1	Preparation of the sub base	136
7.3	Construction of Roller Compacted Concrete pavements	136
7.3.1	Production of Roller Compacted Concrete	136
7.3.2	Transportation of Roller Compacted Concrete	137
7.3.3	Laying of Roller Compacted Concrete	137
7.4	Quality control of Roller Compacted Concrete	141
8.0	Life cycle cost analysis	
8.1	Introduction	144
8.2	Life cycle costing	144
8.2.1	Net present value	145
8.2.2	Equivalent annual value cash flow	145
8.2.3	Determination of discounting factor	146
8.3	Application of life cycle cost methods to roads	147
8.3.1	Introduction	147
8.3.2	General cost components	147
8.4	Calculation of life cycle cost for pavements	147
8.4.1	Calculation of life cycle cost for flexible pavements	148
8.4.2	Calculation of life cycle cost for RCC pavements	152
8.5	Comparison of life cycle costs	159
8.6	Conclusions	159
9.0	Conclusions and recommendations	162

List of Figures

	Page
Chapter 1	
Figure 1.1 Sri Lankan Road network	4
Chapter 4	
Figure 4.1 Strength Vs. W/C	18
Figure 4.2 Higher strength even with low W/C	18
Figure 4.3 Use of low W/C in RCC	19
Figure 4.4 Recommended grading curve (20 mm)	20
Figure 4.5 Recommended grading curve (37.5mm)	21
Figure 4.6 Comparison of RCC material with other concrete materials	22
Figure 4.7 Proctor compaction apparatus	23
Figure 4.8 Typical density curve	23
Figure 4.7(a) Marshal test apparatus	24
Figure 4.7(b) Marshal test apparatus(Compactor)	25
Chapter 5	
Figure 5.1(a) Grading curve of 10mm (single size)	29
Figure 5.1(b) Grading curve of 20mm (single size)	29
Figure 5.2 Void ratio curve	31
Figure 5.3 Grading curve fine aggregate	32
Figure 5.4 Void ratio curve	33
Figure 5.5 Combined grading curve for 20mm aggregate	33
Figure 5.6 Combined grading curve for 20mm aggregate	34
Figure 5.7 Particle size distribution of two aggregate samples B and C	35
Figure 5.8 Modified VB apparatus to measure wet density	36
Figure 5.9 Loaded wet density apparatus	37
Figure 5.10 Variation of wet density with water content	38
Figure 5.11 Variation of air content inside the RCC	39
Figure 5.12 Preparation of sample for flexural test	40
Figure 5.13 The loading arrangement	40
Figure 5.14 Testing procedure	41
Figure 5.15 Variation of flexural strength	42
Figure 5.16 Selection of W/C and cement content	43
Figure 5.17 The grading curve of aggregate base course	45
Figure 5.18 Modified grading curves	46
Figure 5.19 Adopted grading curve for 37.5mm aggregate	47
Figure 5.20 Comparison of density	48
Figure 5.21 Wet density results	51
Figure 5.22 Effect of admixture	54
Figure 5.23 Shrinkage specimen	57

Figure 5.24	Shrinkage measuring apparatus	58
Figure 5.25	28-day shrinkage	59
Figure 5.26(a)	3-day shrinkage	60
Figure 5.26(b)	7-day shrinkage	60
Figure 5.26(c)	21-day shrinkage	61
Figure 5.26(d)	28-day shrinkage	61
Figure 5.27	Effect of size and proportion of aggregate	62
Figure 5.28	Preparation of compressive strength samples	64
Figure 5.29	Test samples	64
Figure 5.30	Relationship between compressive strength and flexural strength	65

Chapter 6

Figure 6.1	Idealization of the foundation	71
Figure 6.2	Location of the load in the Gold beck equation	72
Figure 6.3	Stress Vs equivalent radius of resting section	75
Figure 6.4	Stress Vs. Pavement thickness	75
Figure 6.5	Stress Vs. Sub grade modulus	76
Figure 6.6	Stress Vs. Load	76
Figure 6.7	The position of critical load according to PCA method	78
Figure 6.8	Relationship between CBR and sub grade modulus	80
Figure 6.9	Stress created by single axle single wheel	82
Figure 6.10	Stress created by single axle dual wheel	83
Figure 6.11	Stress created by Tandem axle	84
Figure 6.12	Flow chart for the PCA method	85
Figure 6.13	Figure for AASHTO method	95
Figure 6.14	Effect of sub grade property	96
Figure 6.15	Effect of flexural strength	97
Figure 6.16	Effect of reliability index	97
Figure 6.17	Effect of drainage coefficient	98
Figure 6.18	Effect of load transfer coefficient	98
Figure 6.19	Conversion of load	105
Figure 6.20	Determination of effective sub grade resistance	106
Figure 6.21	Vertical movement at the joint	107
Figure 6.22	Thickness design chart	108
Figure 6.23	A typical expansion joint	112
Figure 6.24	Development of stress due to friction	112
Figure 6.25	Deformation of the bar	115
Figure 6.26	Distribution of the shear	116
Figure 6.27	Variation of dowel size with pavement thickness	117
Figure 6.28	Variation of dowel length with pavement thickness	118
Figure 6.29	Application of the load	118
Figure 6.30	Load distribution	119
Figure 6.31	Main flow chart	123
Figure 6.32	Sub procedure for single axle single wheel	124
Figure 6.33	Selection form	126

Figure 6.34	Single axle single wheel	127
Figure 6.35	Single axle dual wheel	128
Figure 6.36	Tendem axle	129
Figure 6.37	Results form	130

Chapter 7

Figure 7.1	Typical cross section of flexible pavement	134
Figure 7.2	Comparison of load transfer mechanism	135
Figure 7.3	Typical cross section of a concrete pavement	135
Figure 7.4	Concrete pavement construction using concrete pavers	137
Figure 7.5	Manual concrete pavement construction	138
Figure 7.6(a)-(d)	Compaction procedure	139
Figure 7.7	Dowel bar inserter	141

Chapter 8

Figure 8.1	Graphical view of present worth analysis	145
Figure 8.2	Normograph for the flexible pavements	149
Figure 8.3	Life cycle cost for different pavements	159



List of Tables

		Page
Chapter 4		
Table 4.1	Recommended grading curve for 20mm aggregate	20
Table 4.2	Recommended grading curve for 37.5mm aggregate	21
Chapter 5		
Table 5.1	Compacted density	30
Table 5.2	Calculated void ratio	30
Table 5.3	Compacted density	32
Table 5.4	Calculated void ratio	32
Table 5.5(a)	Mix proportions	35
Table 5.5(b)	Mix proportions for aggregate grading B and C	36
Table 5.6	Wet density results	37
Table 5.7	Air content	38
Table 5.8(a)	Flexural strength	41
Table 5.8(b)	Comparison of grading	42
Table 5.9	Mix proportion with quarry dust	45
Table 5.10	Results of ABC	46
Table 5.11	Mix proportion for 37.5mm aggregate	47
Table 5.12	Density results for 37.5mm aggregate	48
Table 5.13	Comparison of strength results	49
Table 5.14	Mix proportion with fly ash	50
Table 5.15	Wet density results	51
Table 5.16	Strength results	52
Table 5.17	Mix proportions	53
Table 5.18	Effect of CaCl ₂	53
Table 5.19	Results of analytical CaCl ₂	54
Table 5.20	Mix proportions	58
Table 5.21	28-day shrinkage strain	59
Table 5.22	Effect of water cement ratio	60
Table 5.23	Comparison of shrinkage	62
Table 5.24	Approximate shrinkage values	63
Table 5.25	Joint spacing	63
Table 5.26	Compressive strength values	65
Chapter 6		
Table 6.1	Allowable repetitions	81
Table 6.2	Axle load categories	86
Table 6.3	Axle load categories	88
Table 6.4	Allowable ADTT axle load category (Pavement with aggregate interlock joints)	89
Table 6.5	Allowable ADTT (dowelled joints)	90



	(Pavement with aggregate interlock joints)	
Table 6.6	Allowable ADDT (interlock joint)	91
Table 6.7	Effect of untreated sub base on k	92
Table 6.8	Categorizing of the soil property	92
Table 6.9	Parameters used	99
Table 6.10	Derived ESWF	99
Table 6.11	Design ESWF	100
Table 6.12	AASHTO pavement design catalogue for low volume roads(R-50%)	101
Table 6.13	AASHTO pavement design catalogue for low volume roads(R-75%)	102
Table 6.14	CBR Value	103
Table 6.15	Categorizing the traffic	103
Table 6.16	Thickness determination	104
Table 6.17	Comparison of thickness values	109
Table 6.18	Different ϕ values	113
Table 6.19	Recommended dowels (PCA)	117
Table 6.20	Recommended dowels (AASHTO)	117
Table 6.21	Load distribution	120
Table 6.22	Variation of compressive strength	121

Chapter 8

Table 8.1	Vehicle distribution	148
Table 8.2	Design parameters for flexible pavement	148
Table 8.3	Unit cost components for flexible pavements	150
Table 8.4	Initial cost components for flexible pavement	151
Table 8.6	Maintenance cost for typical asphalt concrete pavement	151
Table 8.7	Life cycle cost for typical flexible pavement	152
Table 8.8	Design parameters for a typical rigid pavement	152
Table 8.9	Thickness values	153
Table 8.10	Cost for different mixes	153
Table 8.11	Thickness values	153
Table 8.12	Typical maintenance cost for the rigid pavement	154
Table 8.13	Initial cost for Mix-1 (20mm aggregate)	155
Table 8.14	Life cycle cost for Mix-1	156
Table 8.15	Initial cost for Mix-2 (37.5mm aggregate)	157
Table 8.16	Life cycle cost for Mix-2	157
Table 8.17	Initial cost for Mix-3 (ABC)	158
Table 8.18	Life cycle cost for Mix-3	158
Table 8.19	Life cycle cost for different pavement	159