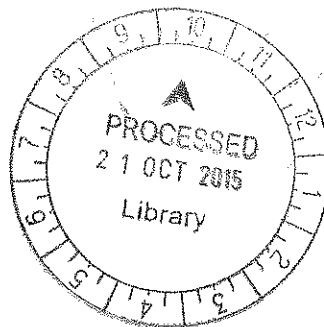


# THE APPLICATION OF RUBBERIZED ROAD IN MALAYSIA

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## DECLARATION BY THE CANDIDATE

I, Chan Man Wiang, I12001241, confirm that the work in this report is my own work and the appropriate credit has been given where references have been made to the work of other researchers.



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## ABSTRACT

This study is about the road pavement construction – rubberized road. It is using the rubberized bitumen as the layer of road surface dressing. Rubberized bitumen is the mixture of hot bitumen with rubber. On 13th October 2014, Datuk Douglas Amar Uggah Embas (Minister of Plantation Industries and Commodities), announced that Malaysia will soon be implementing the use of rubberized road in Malaysia.

The aim of this project is to study the application of rubberized road in Malaysia to determine the reasons and benefits of implementing this construction. To achieve this aim, three objectives are needed. The first objective is to study the construction method of rubberized road; the second objective is to determine the benefits of implementing the construction of rubberized road, and the suitability of constructing rubberized road in Malaysia.

*Objective 3 - 3 not mentioned.*

There are disadvantages of concrete roads and asphalt roads. Concrete roads have disadvantages in terms of cost, safety and noise. While for asphalt roads, they have disadvantages in terms of durability, cost effectiveness (high maintenance cost), and safety. Throughout this project, questionnaire survey and interview survey is conducted. As a result, rubberized road is a beneficial construction, and it is suitable and feasible to be constructed in Malaysia.

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## LIST OF CONTENT

ACKNOWLEDGEMENTS .....	i
DECLARATION BY THE CANDIDATE.....	ii
ABSTRACT.....	iii
LIST OF FIGURES.....	vii
LIST OF TABLES .....	ix
LIST OF APPENDICES.....	x
CHAPTER 1.....	1
1.0 INTRODUCTION.....	1
1.1 Introduction and Background Study .....	1
1.2 Problem Statement .....	6
1.3 Research Goal .....	8
1.3.1 Aim .....	8
1.3.2 Objectives .....	8
1.3.3 Key Questions.....	9
1.4 Importance of Study.....	9
CHAPTER 2.....	11
2.0 LITERATURE REVIEW.....	11
2.1 Introduction of Asphalt road and Concrete road.....	11
2.1.1 Asphalt road.....	15
2.1.1.1 Advantages and Disadvantages.....	15
2.1.1.2 Construction Process.....	17
2.1.2 Concrete road.....	19
2.1.2.1 Advantages and Disadvantages.....	19
2.1.2.2 Construction Process.....	22
2.2 Introduction of Rubberized road .....	24
2.2.1 Advantages of rubberized road.....	26
2.2.2 Construction method.....	30

2.2.2.1 Wet method .....	30
2.2.2.2 Dry method.....	30
2.2.2.3 Wet and dry method .....	31
2.2.2.4 Terminal blend .....	31
2.2.2.5 Construction Process of Rubberized Road in Malaysia .....	32
2.2.3 Experience trials in Malaysia.....	32
2.2.3.1 Klang Trial .....	33
2.2.3.2 Rembau and Tampin .....	34
2.2.3.3 Sg. Buluh trial .....	34
2.2.3.4 KLIA project .....	35
2.2.4 Experience trials in United States .....	36
CHAPTER 3.....	38
3.0 RESEARCH METHODOLOGY .....	38
3.1 Quantitative research.....	38
3.1.1 Questionnaire .....	39
3.2 Qualitative research.....	39
3.2.1 Collect information through resources.....	40
3.2.2 Interview Surveys .....	40
CHAPTER 4.....	42
4.0 DATA COLLECTION AND ANALYSIS .....	42
4.1 Quantitative research-Questionnaire .....	42
4.1.1 Part A- Respondent's Background.....	43
4.1.1.1 Age Range of the Respondents .....	43
4.1.1.2 Employment of Respondents .....	44
4.1.1.3 Years of Experience .....	45
4.1.1.4 Types of Construction Involved.....	46
4.1.2 Part B- The Application of Rubberized Road in Malaysia .....	47
4.1.2.1 Familiarity of Types of Road .....	47

4.1.2.2 Familiarity of Rubberized Road.....	48
4.1.2.3 Voting of the best road construction .....	49
4.1.2.4 Suitable Area for rubberized road .....	50
4.1.2.5 Agreeability to use rubberized bitumen in road surface dressing .....	51
4.1.3 Part C- The feasibility of rubberized road.....	52
4.1.3.1 Feasibility of constructing rubberized road.....	52
4.1.3.2 Constructing rubberized road is an improvement .....	53
4.1.3.3 Comparison of Benefits between Concrete Road, Asphalt Road and Rubberized Road .....	54
4.1.3.4 Comment on the announcement of implementation of rubberized road .....	56
4.2 Qualitative Research-Interview .....	56
4.2.1 Mr Vijayabalan .....	56
4.2.2 Dr Nazirah Binti Ahmad .....	57
4.2.3 Dr Mazlina .....	58
4.3 Summary .....	61
CHAPTER 5.....	64
5.0 CONCLUSION AND RECOMMENDATION .....	64
5.1 Introduction .....	64
5.2 Summary of Research Findings .....	64
5.3 Recommendation.....	66
LIST OF REFERENCES .....	67

## LIST OF FIGURES

Figure 1.1 Crumb Rubber Powder.....	2
Figure1.2 Datuk Ammar Douglas Uggah Embas.....	4
Figure 1.3 Fatigue Cracking on Asphalt Road.....	7
Figure2.1 Composition of Asphalt Road.....	13
Figure 2.2 Composition of Concrete Road.....	13
Figure2.3 Advantages of Asphalt Road.....	15
Figure2.4 Disadvantages of Asphalt Road.....	17
Figure2.5 Construction Process of Asphalt Road.....	18
Figure2.6 Advantages of Concrete Road.....	20
Figure2.7 Disadvantages of Concrete Road.....	22
Figure2.8 Construction Process of Concrete Road.....	22
Figure2.9 The Chronology rubberized road research trials.....	26
Figure2.10      Figure2.11.....	27
Figure2.12 Figure2.13.....	28
Figure2.14Figure2.15.....	29
Figure2.16 Construction Process of Rubberized Road.....	32
Figure2.17 Experiment Trials in the Unites States.....	37
Figure 3.1 Research Methodology.....	38
Figure 4.1 Age Range of the Respondents.....	43
Figure 4.2 The Employment of Respondents .....	44
Figure 4.3 Years of working Experience.....	45
Figure 4.4 Types of construction field involved by respondents.....	46
Figure 4.5 Familiarity of different types of roads among the respondents.....	47



Figure 4.6 Familiarity of rubberized road among the respondents.....	48
Figure 4.7 Choosing of the best road construction.....	49
Figure 4.8 Suitable area for rubberized road.....	50
Figure 4.9 Agreeability to use rubberized bitumen in road surface dressing.....	51
Figure 4.10 Feasibility of constructing rubberized road.....	52
Figure 4.11 constructing rubberized road is an improvement.....	53
Figure 4.12 Comparison of benefits between concrete road, asphalt road and rubberized road...	54

## LIST OF TABLES

Table 4.1 Age range of the respondents.....	43
Table 4.2 The employment of respondents.....	44
Table 4.3 Years of working experience of respondents.....	45
Table 4.4 Types of construction field involved by respondents.....	46
Table 4.5 Familiarity of different types of roads among the respondents.....	47
Table 4.6 Familiarity of rubberized road among the respondents.....	48
Table 4.7 Choosing of the best road construction.....	49
Table 4.8 Suitable area for rubberized road.....	50
Table 4.9 Agreeability to use rubberized bitumen in road surface dressing.....	51
Table 4.10 Feasibility of constructing rubberized road.....	52
Table 4.11 Constructing rubberized road is an improvement.....	53
Table 4.12 Comparison of benefits between concrete road, asphalt road and rubberized road...	54

## LIST OF APPENDICES

### Appendix A

- A.1 Construction process of asphalt road for unpaved road.....A-1
- A.2 Portland Cement Concrete Pavement.....A-5

### Appendix B

- B.1 Interview Session.....B-1
- B.2 Questionnaire Survey Form.....B-2

### Appendix C

- C.1 Work Program.....C-1
- C.2 Turn It In Originality Report.....C-2

## CHAPTER 1

### 1.0 INTRODUCTION

#### 1.1 Introduction and Background Study

Roadways are a complete aspect of transport infrastructure. In the road construction, engineers have to consider the requirements of the road users in regards to safety as well as economy (Mashaan, 2014). As we travel the roads every day in Malaysia, bitumen and concrete are the common materials to be used in road pavement construction as they are the traditional method to construct road pavements. However, both of them has their own disadvantages to the road users as well as economy. In fact, there is another method to construct road pavements – rubberized road, which tends to bring more benefits to the road users as well as environment.

Rubberized road is actually one of the types of flexible pavements. It is using the rubberized bitumen as the layer of road surface dressing (George Way, 2006). Surface-dressing is a well-established and highly effective method of maintaining road surfaces (Ibrahim, 2005). Rubberized bitumen is the mixture of hot bitumen with rubber. The strength of the bond between bitumen and tar is not high and, particularly in the case of bitumen, it is not sufficiently strong to resist displacement by water, hence pot-holes grow with surprising rapidity. Quite small quantities of rubber improve the cohesive strength of bitumen; it becomes tougher and more tenacious. Rubber makes bitumen less brittle and increases the range of temperatures over which it remains serviceable. The flexibility which rubber imparts allows it to hold more securely to aggregate against displacement forces. . The following is the equations showing how rubberized bitumen is formed (Ahmad, 2015).

- Rubber + bitumen = binder
- (rubber + bitumen) + aggregate = rubberized premix for road pavement

There are many types of rubber can be added into the hot bitumen to form rubberized bitumen:

- Crumb tire
- Latex
- Used gloves
- Synthetic rubber
- Waste rubber
- Solid rubber

Crumb tire rubber is also termed as ground rubber, it is derived from post-consumer waste or scrap tires (George Way, 2006) which will then processed with a granular or cracker mill, to reduce the size of particles further. Rubberized bitumen is a very good material that can be used to seal cracks and joints (George Way, 2006).



**Figure 1.1 Crumb Rubber Powder**

In Malaysia, solid rubber is added to the mixture of hot bitumen. During taping, the latex (which is the milk from the rubber tree) in liquid form will flow to a cup, but it is hard to sold out and it costs not much in Malaysia. therefore, the tapper will leave the cup of latex over one night, so that the latex will become solid form in the next day, some local people called it at 'kaplam'. One cup of 'kaplam' is sold RM2, where the actual price should be RM4.60. From here, we can know that the price of the local latex is getting lower compared to the past (Ahmad, 2015).

Rubberized bitumen is extensively used in the highway paving industry in the United States of America, South Africa, and several countries of Western Europe (George Way, 2006). Thailand is also using rubberized bitumen as the road pavement starting from last year (New Straits Times, 2014). The initial development of rubberized road was pioneered in the mid of 1960's when Charles McDonald began searching for a method of maintaining pavements which were in a failed pavement condition as a result of primarily cracking.

According to Datuk Amar UggahEmbass, the Minister of Plantation Industries and Commodities announced that Malaysia will soon to be implementing rubberized road by June 2015. "Some of them have used natural rubber for road construction. Malaysia will also be one of them," he said this at a media briefing during the Association of Natural Rubber Producing Countries Annual Rubber Conference 2014(New Straits Times, 2014).



**Figure1.2 Datuk Ammar Douglas Uggah Embas**

He also said that Thailand, which has conducted the rubberized road construction, found that although the initial investment might be high, the construction of rubberized road has a lower maintenance cost by comparing to concrete road and bituminous road (New Straits Times, 2014). It is because rubberized pavements Rubberized road have excellent durability in terms of cracking and aging resistance. Hence, the life cycle cost of rubberized road is lower than the bituminous road and concrete road, and the value-for-money can be achieved in terms of long run.

As we know that rubber is one of the export items in Malaysia. Countries such as Thailand, Malaysia and Indonesia have agreed to “manage” the natural rubber exports to international markets (CNBC, 2014). These countries supply nearly 70 percent of the world’s natural rubber (CNBC, 2014). Feeble demand in an amply supplied market has already pushed down the rubber prices to below production costs. One of the intentions of Malaysia constructing rubberized road is to create a small business to help the tappers and to increase the price of rubber in Malaysia. Despites of the benefits of constructing rubberized road bring to users and