CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Road is a wide way leading from one place to another, especially one with a prepared surface that vehicles can use. Road play a very important role in the socio-economic development of the country. Therefore, road pavement needs to be maintained from time to time to achieve its purpose and contributes comfort to the road users (Aziz, 2007). A major step in the improvement of the existing performance of roads starts with ensuring proper mix design and using suitable ingredients (Dr Hassan H.Jony, Mays F.Al-Rubaie, Israa Y.Jahad, 2011). Pavement is the actual travel surface especially made durable and serviceable to withstand the applied load by vehicles commuting upon it. Pavement grants friction for the vehicles thus providing comfort to the driver and transfers the traffic load from the upper surface to the natural soil. There are three major types of pavement which are flexible, rigid and composite. Flexible pavement is most common used in the most of the Malaysia roadway. This type of pavement is a construction of bituminous and granular material with hot mix asphalt (HMA) poured on top level. A flexible pavement structure is generally composed of several layers which are subgrade, sub base, base, binder and wearing course. Flexible pavements are easily, quickly constructed and repaired. It does generally require a maintenance or rehabilitation every 10 to 15 years.

1.2 PROBLEM STATEMENT

Flexible pavement is most common used in the most of the Malaysia roadway. There are three major failures of pavement such as rutting, fatigue cracking and thermal cracking. Since our country has inconsistences weather conditions, so the temperature affect the conditions of the pavement. Moreover, over load by heavy vehicles also can cause the structure of the pavement become weak and leads to the damage of the road pavement. Besides that, the creation of non-decaying waste materials such as plastic has resulted in a waste disposal crisis and effect to our environments. To solve this problem one of the solution is by recycling waste into useful products. So, by this research the waste materials will be utilized in asphalt to reduce the pollution beside to improve engineering properties of asphalt.

1.3 OBJECTIVE

The objectives of the study are:

1. To determine optimum bitumen content of asphalt mixtures by using waste HDPE as coarse aggregate and Kaolin as filler.
2. To investigate stiffness modulus of modified asphalt.
3. To determine the permanent deformation behavior of modified asphalt by using Repeated Load Axial Test.

1.4 SCOPE OF STUDY

This study is mainly about experimental in laboratory. There are two types of samples for this research which is control sample and modified sample. For both control and modified sample, the aggregate gradation of ACW 14 for wearing course in Standard Specification of Road Work in Malaysia with 80/100 penetration grade bitumen had been used. For control samples, it is following the aggregate gradation of ACW 14 in Standard Specification of Road Work in Malaysia with 4%, 4.5%, 5%,

5.5% and 6% of bitumen contents and Portland cement as filler. While for modified samples, it is divided by two types. Type 1 was used Waste High Density Polyethylene (HDPE) in flakes form in range of 2% until 10% (by weight) in replacing the coarse aggregate and using Portland cement as filler. For type 2 of modified samples, same range of HDPE (by weight) is used for replaced the coarse aggregate and Kaolin for replace the Portland cement as filler. In finding the optimum bitumen content, Density and Voids Analysis has been done using the controls sample and the results was applied for modified samples. Both control and modified samples was tested with Indirect Tensile Stiffness Modulus Test (ITSM) in order to investigate the stiffness of modified asphalt. Meanwhile the permanent deformation of modified asphalt mixture was determined by using the Repeated Load Axial Test (RLAT).

1.5 SIGNIFICANT OF STUDY

The uses of waste HDPE as coarse aggregate replacement in HMA is expected to resolve environmental problems. Since it cannot be composed, then the using of waste HDPE as alternative materials in road construction, this problem can be overcome to some extent. The cost of road construction also can be reduced since HDPE is a waste material.

Besides that, the use of Kaolin as filler in HMA is also expected to increase the viscosity of the bitumen thus increasing the strength of the bond between the bitumen and aggregate. Moreover, there is not much research on Kaolin as filler in HMA, so this study will help other researchers to get information about Kaolin in HMA mixture. In future, Kaolin may be used as a filler to replace existing mineral filler that currently used in HMA.