EFFECT OF AGGREGATE GRADATION ON POROUS ASPHALT PROPERTIES

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Specialty dedicated to my beloved father and mother,

Abdul Rahman bin Wahab and Fatimah bt Jusoh

My siblings and all my families

All my friends

Thanks for your sacrifices and support……..

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ABSTRACT

Rainwater or storm water is very common in Malaysia and even at certain time, several places in this country will face the flooding problem. This condition will give a big trouble to the road in Malaysia as majority of them were made by asphaltic concrete. The run off from the rain water if it is not discharge as soon as possible will cause a lot of problem to the road user as well as for the condition of road itself. Based on the previous study, one of this problem solving is by using porous asphalt as wearing course of pavement. In order of that, this study was conducted to evaluate the effect of aggregate gradation on porous asphalt properties. The method is to compare the properties of Grading A and Grading B based on JKR specification (JKR/SPJ/2008) and binder used is PG76 bitumen. The void ratio of the test specimen was controlled in order to ensure the sufficient permeability of porous asphalt. There are several tests was conducted to evaluate properties of the specimen such as abrasion loss test, binder draindown test, resilient modulus test, creep test, and stability test. The test results indicated that gradation affected the performance and properties of porous asphalt mixtures. Grading B showed the best result in term of the physical properties and performance of porous asphalt mixture. The result from both gradations varies caused by difference of the aggregate size proportion of them. The difference aggregate size proportion resulted in difference arrangement of aggregate skeleton in mixture, thus affected the porosity of mixture. It will also affect an ability of granular to resist cyclic load from the pavement surface, and then affected the physical properties of them.

ABSTRAK

Air hujan atau ribut air adalah perkara biasa di Malaysia dan juga pada masa tertentu, beberapa tempat di negara ini akan menghadapi masalah banjir . Keadaan ini akan memberikan masalah besar kepada jalan raya di Malaysia kerana kebanyakkannya dibuat oleh campuran konkrit asfalt . Air hujan yang mengalir atas jalan jika ia tidak dialirkan secepat mungkin akan menyebabkan banyak masalah kepada pengguna jalan raya dan juga untuk keadaan jalan itu sendiri. Berdasarkan kajian sebelum ini, salah satu penyelesaian masalah ini adalah dengan penggunaan asfalt berliang sebagai turapan. Oleh itu, kajian ini telah dijalankan untuk menilai kesan penggredan agregat ke atas sifat-sifat asfalt berliang. Kaedah ini adalah untuk membandingkan sifat-sifat Penggredan A dan Penggredan B berdasarkan spesifikasi JKR (JKR/SPJ/2008) dan bahan pengikat yang digunakan adalah bitumen PG76. Nisbah lompang spesimen ujian telah dikawal bagi memastikan kebolehtelapan yang mencukupi bagi asfalt berliang. Terdapat beberapa ujian telah dijalankan untuk menilai sifat-sifat spesimen seperti ujian kehilangan lelasan, pengaliran bitumen, ujian modulus berdaya tahan, ujian rayapan (*Creep*), dan ujian kestabilan. Keputusan ujian menunjukkan bahawa penggredan menjejaskan prestasi dan sifat-sifat campuran asfalt berliang. Penggredan B menunjukkan hasil yang terbaik dari segi sifat-sifat fizikal dan prestasi campuran asfalt berliang. Nilai daripada kedua-dua penggredan ini berbeza disebabkan oleh perbezaan pembahagian saiz agregat mereka. Pembahagian saiz agregat mempengaruhi susunan agregat di dalam campuran, dengan itu menjejaskan keliangan campuran. Ia juga akan memberi kesan kepada keupayaan berbutir agregat untuk menentang beban dari permukaan jalan raya, dan kemudian memberi kesan kepada sifat-sifat fizikal mereka.