

ANALISIS PENGARUH SUBSTITUSI ASPAL DENGAN STYROFOAM PADA CAMPURAN ASPHALT CONCRETE BASE TERHADAP KARAKTERISTIK MARSHALL

Nama Mahasiswa : Gilang Anugrah
Nim : 4204221467
Dosen Pembimbing : Ir. Lizar, S.T., M.T.

ABSTRAK

Perkerasan jalan lentur, khususnya lapisan *Asphalt Concrete Base* (AC-Base), membutuhkan aspal dalam jumlah besar sebagai bahan pengikat, sementara harga dan ketersediaan aspal semakin terbatas. Di sisi lain, limbah *styrofoam* terus bertambah dan sulit terurai secara alami sehingga menjadi masalah lingkungan. Penelitian terdahulu banyak membahas *styrofoam* sebagai bahan tambah pada campuran AC-WC atau AC-BC, sedangkan penggunaannya sebagai bahan substitusi sebagian aspal pada campuran AC-Base masih jarang diteliti. Kondisi ini menjadi celah penelitian yang mendasari kajian ini. Penelitian bertujuan mengetahui karakteristik material dasar, menentukan Kadar Aspal Optimum (KAO), serta menganalisis pengaruh substitusi aspal dengan *styrofoam* sebesar 3% hingga 12% terhadap karakteristik *Marshall* campuran AC-Base. Metode yang digunakan adalah eksperimen laboratorium mengacu pada Spesifikasi Umum Bina Marga 2018 Revisi 2, meliputi pengujian agregat, aspal penetrasi 60/70, dan pengujian *Marshall* terhadap 48 benda uji untuk memperoleh nilai stabilitas, *flow*, VIM, VMA, VFA, dan *Marshall Quotient*. Hasil penelitian menunjukkan KAO diperoleh pada kadar aspal 5%. Substitusi *styrofoam* meningkatkan stabilitas hingga kadar 9% namun menurunkan nilai VFA dan meningkatkan VIM serta VMA seiring bertambahnya kadar *styrofoam*. Berdasarkan seluruh parameter Marshall, kadar substitusi 3% merupakan kadar yang paling memenuhi spesifikasi sehingga direkomendasikan sebagai kadar substitusi yang sesuai untuk campuran AC-Base.

Kata Kunci: Styrofoam, Asphalt Concrete Base, Karakteristik Marshall, Substitusi Aspal, Kadar Aspal Optimum

ANALYSIS OF THE EFFECT OF ASPHALT SUBSTITUTION WITH STYROFOAM IN ASPHALT CONCRETE BASE MIXTURES ON MARSHALL CHARACTERISTICS

Student Name : Gilang Anugrah
Student Number : 4204221467
Supervisor : Ir. Lizar, S.T., M.T.

ABSTRACT

Flexible pavement, particularly the Asphalt Concrete Base (AC-Base) layer, requires a large amount of asphalt as a binder, while the price and availability of asphalt continue to be limited. On the other hand, styrofoam waste keeps increasing and is difficult to decompose naturally, making it a serious environmental problem. Previous studies have mostly examined styrofoam as an additive in AC-WC or AC-BC mixtures, while its use as a partial substitute for asphalt in AC-Base mixtures has rarely been studied. This gap forms the basis of the present research. This study aims to determine the characteristics of the base materials, establish the Optimum Asphalt Content (OAC), and analyze the effect of substituting asphalt with styrofoam at levels of 3% to 12% on the Marshall characteristics of AC-Base mixtures. The method used is a laboratory experiment based on the 2018 Bina Marga General Specifications Revision 2, covering aggregate testing, 60/70 penetration asphalt testing, and Marshall testing on 48 specimens to obtain stability, flow, VIM, VMA, VFA, and Marshall Quotient values. The results show that the OAC was obtained at an asphalt content of 5%. Styrofoam substitution increased stability up to a content of 9%, but decreased VFA values and increased VIM and VMA as the styrofoam content increased. Based on all Marshall parameters, a substitution level of 3% best met the specification requirements and is therefore recommended as the appropriate substitution level for AC-Base mixtures.

Keywords: Styrofoam, Asphalt Concrete Base, Marshall Characteristics, Asphalt Substitution, Optimum Asphalt Content