PENGARUH PENAMBAHAN LIMBAH PLASTIK *MULTILAYER* TERHADAP KARAKTERISTIK CAMPURAN AC – WC

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ABSTRAK

Peningkatan jumlah limbah plastik *multilayer* yang sulit didaur ulang menjadi permasalahan lingkungan yang massif dan perlu ditangani. Pemanfaatan limbah sebagai material alternatif merupakan strategi menekan dampak lingkungan sekaligus meningkatkan nilai guna limbah tersebut. Bidang konstruksi jalan dapat memanfaatkan limbah sebagai bahan substitusi agregat pada campuran perkerasan. Penelitian bertujuan menganalisis dampak pemanfaatan plastik *multilayer* sebagai bahan substitusi parsial agregat karakteristik *Marshall* serta nilai *Cantabro Loss* campuran *Asphalt Concrete - Wearing Course* (AC - WC). Metode eksperimen laboratorium digunakan dengan variasi kadar plastik *multilayer* sejumlah 0%, 2%, 4%, 6%, dan 8% dari berat agregat. Proses pencampuran menggunakan metode kering (*dry process*) untuk mengevaluasi perubahan karakteristik campuran akibat penambahan material. Perancangan campuran mengacu kadar aspal optimum 5,75%. Evaluasi kinerja campuran melalui pengujian *Marshall* mengevaluasi beberapa parameter, yaitu stabilitas, *flow*, *Void in Mix* (VIM), *Void in Mineral Aggregate* (VMA), *Void Filled with Asphalt* (VFA), *Marshall Qoutien* (MQ), hingga uji *Cantabro Loss*. Hasil penelitian menunjukkan substitusi agregat plastik *multilayer* meningkatkan nilai stabilitas dari 3359,13 kg menjadi 4432,13 kg. Nilai *flow* meningkat dari 2,77 mm menjadi 3,91 mm, memenuhi persyaratan Spesifikasi Umum Bina Marga 2018. Hasil penelitian menujukkan peningkatan nilai VIM dari 4,18% menjadi 7,00%, sedangkan VMA menurun dari 15,24% menjadi 14,63%. Nilai VFA meningkat dari 65,60% menjadi 68,36% dan seluruh variasi memenuhi spesifikasi. Hasil *Cantabro loss* menunjukkan nilai kehilangan terendah sebesar 1,86% pada variasi 2%. Berdasarkan evaluasi seluruh parameter, kadar plastik *multilayer* optimum diperoleh variasi 2% karena memenuhi seluruh persyaratan *Marshall* dan menghasilkan durabilitas terbaik.

Kata kunci: AC-WC, plastik *multilayer*, *Marshall*, *Cantabro loss*, perkerasan jalan

THE EFFECT OF ADDITIONAL MULTILAYER PLASTIC WASTE ON THE CHARCTERISTICS OF AC - WC

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ABSTRACT

The increasing volume of multilayer plastic waste, which is difficult to recycle, has become a significant environmental challenge requiring effective management. Untilizing such waste as an alternative material offers a strategy to reduce environmental impacts while enhancing its value. In road constraction, waste materials can be used as aggregate substitutes in pavement mixtures. This study evaluates the effect of multilayer plastic as a partial aggregate sustitute on the Marshall characteristics and Cantabro Loss of Asphalt Concrete-Wearing Course (AC-WC) mixtures. A laboratory experimental method was employed using multilayer plastic contents of 0%, 2%, 4%, 6% and 8% by aggregate weight. The dry process was applied to assess changes in mixtures performance, with an optimum asphalt content of 5,75%. Performance evaluation include Marshall stability, flow, Void in Mix (VIM), Void in Mineral Aggregate (VMA), Void Filled with Asphalt (VFA), Marshall Qoutient (MQ), dan Cantabro Loss tests. The results showed that multilayer plastic substitution increased stability from 3359,13 kg to 4432,13 kg an flow from 2,77 mm to 3,91 mm, satisfying the 2018 Bina Marga General Specifications. VIM increased form 4,18% to 7,00%, while VMA decreased from 15,24% to 14,63%. VFA increased from 65,60% to 68,36%, with all mixtures meeting specification requirements. The lowest Cantabro Loss value, 1,86%, was obtained at 2% plastic content. Based on all performance parameters, the optimum multilayer plastic content was 2% as it satisfied all Marshall criteria and provided the highest durability.

Keywords: AC-WC, *multilayer plastic, Marshall characteristics, Cantabro loss, pavement.*