LEMBAR PENGESAHAN SKRIPSI

"TINJAUAN KARAKTERISTIK MARSHALL *ASPHALT CONRATE WEARING COURSE (AC-WC)* MENGGUNAKAN LIMBAH PLASTIK *POLY ETHYLENE TEREPHTHALATE (PET)*"

Oleh

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Telah dipertahankan di depan dewan penguji

Hari/ Tanggal : Jumat/ 1 Oktober 2021

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"Tinjauan Karakteristik Marshall Campuran *Asphalt Concrate Wearing Course (AC-WC)* Menggunakan Limbah Plastik *Poly Ethylene Terephthalate (PET)*"

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INTISARI

Moh. Alkam, 2021. **Tinjauan Karekteristik Marshall Campuran *Asphalt Concrate Wearing Course (AC-WC)* Menggunakan Limbah Plastik *Poly Ethylene Terephthalate (PET)*.** Program Studi S1 Teknik Sipil, Jurusan Teknik Sipil, Fakultas Teknik, Universitas Negeri Gorontalo. Pembimbing I, Frice L Desei S.T., M.Sc. dan Pembimbing II, Fadly Achmad S.T., M.Eng.

Campuran beraspal memiliki beberapa kelemahan seperti mengalami deformasi permanen disebabkan tekanan terlalu berat oleh muatan truk, keretakan-keretakan yang ditimbulkan oleh panas, dan juga disebabkan oleh kelembaban. Limbah plastik yang semakin menumpuk membuka peluang untuk dimanfaatkan pada campuran beraspal guna meningkatkan kinerja campuran beraspal. Berdasarkan hal tersebut, maka perlu dilakukan penelitian mengenai subtitusi limbah plastik pada campuran beraspal.

Penelitian ini dilakukan dengan mensubtitusikan limbah plastik ke dalam aspal, kemudian dicampurkan ke agregat. Berat aspal diambil dari kadar aspal optimum. Proses pencampuran dilakukan pada suhu ±170°C. Pencampuran dilakukan dengan teknik pencampuran kecepatan tinggi, untuk menjaga suhu tetap stabil selama pencampuran. Pemadatan dilakukan pada suhu ±150-160°C. Benda uji dibuat sebanyak 25 sampel untuk menentukan kadar aspal optimum dan 25 sampel untuk campuran beraspal dengan limbah plastik. Jenis plastik yang digunakan adalah *Poly Ethylene Terephthalate (PET)* dengan persentasi kadar plastik 0,3%; 0,6%; 0,9%; 1,2%; dan 1,5%.

Berdasarkan hasil penelitian didapatkan nilai stabilitas tertinggi pada kadar plastik 1,2% sebesar 1.176,06 kg. Nilai stabilitas yang memenuhi syarat spesifikasi interim campuran beraspal plastik adalah kadar plastik 0,6%; 0,9%; dan 1,2% berturut-turut sebesar 981,02 kg; 1152,78 kg; dan 1.176,06 kg. Nilai *flow* tertinggi pada kadar plastik 1,5% sebesar 3,62 mm. Nilai *MQ* tertinggi pada kadar plastik 0,9% sebesar 331,26. *VIM* pada campuran aspal plastik cenderung meningkat seiring penambahan kadar plastik. Nilai *VIM* berturut-turut 3,79%; 4,10%; 4,19%; 4,29%; dan 4,33%. Nilai *VMA* meningkat dengan nilai berturut-turut 19,08%; 19,34%; 19,42%; 19,51%; dan 19,52%. Nilai *VFA* dan kepadatan menurun seiring bertambahnya kadar plastik. Nilai *VFA* berturut-turut 80,15%; 78,81%; 78,41%; 77,99%; dan 77,82% dan nilai kepadatan secara berturut-turut 2,32 gr/cm^3; 2,32 gr/cm^3; 2,31 gr/cm^3; 2,31 gr/cm^3; dan 2,31 gr/cm^3. Hasil analisis menunjukkan pada kadar plastik 1,2% cocok untuk digunakan pada campuran aspal dengan nilai stabilitas sebesar 1.176,06 kg. Nilai ini meningkat sebesar 38% dari nilai stabilitas campuran aspal konvensional.

Kata Kunci : Campuran Aspal Plastik, Limbah *PET*, *Marshall*.

ABSTRACT

Moh. Alkam, 2021. **An Overview of Marshall Characteristics of Asphalt Concrete Wearing Course (AC-WC) Mixture Using Polyethylene Terephthalate (PET) Plastic Waste.** Bachelor's Degree Program in Civil Engineering, Department of Civil Engineering, Faculty of Engineering, State University of Gorontalo. The Principal Supervisor is Frice L. Desei, S.T., M.Sc, and the Co-supervisor is Fadly Achmad, S.T., M.Eng.

Asphalt mixtures have several disadvantages, such as permanent deformation caused by too heavy pressure by truckloads and cracks caused by heat and humidity. In addition, plastic wastes that are increasingly piling up provide opportunities to be used in asphalt mixtures to improve the performance of asphalt mixtures. Concerning this issue, research about the substitution of plastic waste in asphalt mixtures is highly essential to be conducted.

Moreover, this research was performed by substituting plastic waste into the asphalt and then mixing it into aggregate. The asphalt weight was taken from optimum asphalt content, while the mixture process was performed at the temperature of ± 170°C by employing a high-speed mixing technique to keep the temperature stable during the mixing process. In comparison, the compaction was conducted at the temperature of ± 150-160°C. At the same time, the test object was made as many as 25 samples to determine the optimum asphalt content and 25 samples for a mixture of asphalt with plastic waste. The type of plastic used in this research was Polyethylene Terephthalate (PET), with a percentage of plastic waste contents of 0,3%; 0,6%; 0,9%; 1,2%; and 1,5%.

The research finding obtained that the highest stability value was 1.176,06 kg at 1,2% plastic content. Specifically, the stability values that met the interim specifications for asphalt plastic mixture were 981,02 kg; 1.152,78 kg; and 1.176,06 kg at plastic contents of 0,6%; 0,9%; and 1,2%, respectively. The highest flow was 3,62 mm at 1,5% plastic content, and the highest MQ was 331,26 kg/mm at 0,9% plastic content. At the same time, the addition of plastic content tended to increase VIM in plastic asphalt mixtures. The VIM values were 3,79%; 4,10%; 4,19%; 4,29%; and 4,33%, respectively. Likewise, the addition of plastic contents could increase VMA values in asphalt mixture where the VIM values were 19,08%; 19,34%; 19,42%; 19,51%; and 19,52%, consecutively. In contrast, adding plastic content to the asphalt mixture could decrease VFA and density values. In detail, the VFA values were 80,15%; 78,81%; 78,41%; 77,99%,; and 77,82% respectively, whilst the consecutive density values were 2,32 gr/cm^3; 2,32 gr/cm^3; 2,32 gr/cm^3; 2,31 gr/cm^3; and 2,31 gr/cm^3. Based on this analysis result, it could be inferred that 1,2% plastic content was suitable for use in asphalt mixtures with a stability value of 1.176,06 kg. This value increased by 38% from the stability value of conventional asphalt mixtures.

Keywords: Plastic Asphalt Mixture, PET Waste, Marshall.