

**PENGGUNAAN LIMBAH PLASTIK PADA PERKERASAN
LASTON ASPHALT CONCRETE-WEARING COURSE**

LAPORAN PENELITIAN

*Sebagai Salah Satu Syarat untuk Menyelesaikan Program Profesi pada Program
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ELSA EKA PUTRI
NIM. 2341612104

PEMBIMBING:

Prof. Ir. NILDA TRI PUTRI, M.T, Ph.D, IPU., ASEAN Eng.

**PROGRAM STUDI PENDIDIKAN PROFESI INSINYUR
SEKOLAH PASCASARJANA UNIVERSITAS ANDALAS
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ABSTRAK

Masalah kerusakan jalan beraspal akibat genangan air ditambah beban berlebih serta 75% kebutuhan aspal dalam negeri masih impor. Di sisi lain adanya masalah tumpukan limbah plastik yang bernilai rendah yang terus bertambah dan kesamaan unsur kimia plastik dengan aspal. Penelitian sebelumnya menunjukkan bahwa dimungkinkan untuk menggunakan limbah plastik di perkerasan aspal untuk meningkatkan kinerja perkerasan jalan dan umur pelayanan jalan. Penelitian ini dilakukan untuk mengetahui pengaruh air terhadap stabilitas campuran panas AC-WC dengan menggunakan kalaborasi campuran limbah plastik (40%LDPE, 30%PP, 30%PS) sebagai pengganti aspal dan metode pencampuran kering. Variasi limbah plastik yang digunakan adalah 0%, 8%, 10%, 12%, 14% terhadap berat aspal. Pelaksanaan penelitian terdiri dari pemeriksaan karakteristik bahan dan campuran panas aspal AC-WC, perancangan gradasi agregat, pengujian marshall untuk penentuan kadar aspal optimum, pengujian marshall untuk penentuan kadar plastik optimum. Dari campuran Kadar Plastik Optimum yang didapat dilanjutkan mengukur pengaruh rendaman air dengan variasi waktu rendaman 30 menit, 24 jam, 48 jam, 72 jam, 96 jam pada suhu 60°C terhadap stabilitas dan durabilitas campuran aspal modifikasi limbah plastik. Tinjauan Indeks Durabilitas campuran berdasarkan indikator Index of Retained Stability (IRS) dan Stability Deformation Index, yaitu Indeks Durabilitas Pertama (IDP), Indeks Durabilitas Kedua (IDK), Nilai Absolut Ekuivalen Kekuatan Tersisa (Sa) atau Retained Marshall Stability (RMS). Dari penelitian didapatkan campuran kadar plastik optimum 10% pada kadar aspal optimum 6,3%. Hasil penelitian menunjukkan bahwa campuran laston AC-WC modifikasi limbah plastik mampu lebih lama direndam air, dengan nilai IRS 94,64% durasi perendaman 24 jam, 91,04% durasi perendaman 48 jam, 85,18% durasi perendaman 72 jam dan 82,57% durasi perendaman 96 jam. Nilai IDP menunjukkan nilai r positif yang mengidentifikasi kehilangan kekuatan, dengan nilai r 0,228% pada durasi perendaman sampai 24 jam, 0,150% pada durasi perendaman 24 jam sampai 48 jam, 0,244% pada durasi perendaman 48 jam sampai 72 jam, 0,109% pada durasi perendaman 72 jam sampai 96 jam. Nilai IDK menunjukkan nilai a positif yang mengidentifikasi kehilangan kekuatan, dengan nilai a 2,734 % dan sa 97,266 % pada durasi perendaman 24 jam. Pada durasi perendaman 24 jam sampai 48 jam nilai a 2,703 % dan sa 94,563 %. Durasi perendaman 48 jam sampai 72 jam nilai a 4,881 % dan sa 89,683 % dan pada durasi perendaman 72 jam sampai 96 jam nilai a 2,283 % dan sa 87,400 %.

Kata Kunci: AC - WC, Limbah plastik, Durabilitas

ABSTRACT

The problem of damage to asphalt roads due to waterlogging is compounded by excessive loads and 75% of domestic asphalt needs are still imported. On the other hand, there is the problem of growing piles of low-value plastic waste and the similarity of the chemical elements of plastic to asphalt. Previous research shows that it is possible to use plastic waste in asphalt pavements to improve pavement performance and road service life. This research was conducted to determine the effect of water on the stability of AC-WC hot mixtures using a collaborative mixture of plastic waste (40% LDPE, 30% PP, 30% PS) as a substitute for asphalt and a dry mixing method. The variations in plastic waste used are 0%, 8%, 10%, 12%, 14% of the asphalt weight. The research implementation consisted of examining the characteristics of AC-WC asphalt hot mixes and materials, designing aggregate gradations, Marshall testing to determine optimum asphalt content, Marshall testing to determine optimum plastic content. From the Optimum Plastic Content mixture obtained, we continued to measure the effect of water immersion with varying immersion times of 30 minutes, 24 hours, 48 hours, 72 hours, 96 hours at a temperature of 60°C on the stability and durability of the plastic waste modified asphalt mixture. Overview of the mixed Durability Index based on the Index of Retained Stability (IRS) and Stability Deformation Index indicators, namely the First Durability Index (IDP), Second Durability Index (IDK), Absolute Value of Equivalent Remaining Strength (Sa) or Retained Marshall Stability (RMS). From the research, it was found that the mixture had an optimum plastic content of 10% with an optimum asphalt content of 6.3%. The research results showed that the Laston AC-WC mixture modified from plastic waste was able to be soaked in water for longer, with an IRS value of 94.64% for a soaking duration of 24 hours, 91.04% for a soaking duration of 48 hours, 85.18% for a soaking duration of 72 hours and 82.57% for a soaking duration of 96 hours. The IDP value shows a positive r value which identifies loss of strength, with an r value of 0.228% for a soaking duration of up to 24 hours, 0.150% for a soaking duration of 24 hours to 48 hours, 0.244% for a soaking duration of 48 hours to 72 hours, 0.109% for a soaking duration of 72 hours to 96 hours. The IDK value shows a positive a value which identifies loss of strength, with an a value of 2.734% and a sa of 97.266% for a soaking duration of 24 hours. For a soaking duration of 24 hours to 48 hours, the value of a is 2.703% and sa is 94.563%. The soaking duration of 48 hours to 72 hours has a value of 4.881% and sa 89.683% and for a soaking duration of 72 hours to 96 hours the value of a is 2.283% and sa is 87.400%.

Keywords: AC - WC, Plastic waste, Durability