

KARAKTERISTIK MARSHALL CAMPURAN BERASPAL AC-WC TANPA DAN DENGAN PENAMBAHAN LIMBAH PLASTIK *LOW* *DENSITY POLYETHYLENE* (LDPE) PADA BERBAGAI DURASI RENDAMAN AIR LAUT

INTISARI

Permasalahan kerusakan jalan di wilayah pesisir Indonesia salah satunya disebabkan oleh genangan air laut akibat banjir rob yang dapat menurunkan kualitas dan umur layan perkerasan aspal. Di sisi lain, akumulasi limbah plastik jenis *Low Density Polyethylene* (LDPE) semakin meningkat dan belum tertangani dengan baik. Penelitian ini bertujuan untuk mengetahui karakteristik marshall campuran beraspal AC-WC dengan penambahan limbah plastik LDPE 3% dalam menghadapi berbagai durasi rendaman air laut. Metode yang digunakan adalah pencampuran kering (*dry mixing*) dan pengujian marshall dilakukan mengacu pada SNI 2489 tahun 2018 dan Spesifikasi Umum Bina Marga 2018. Campuran beraspal AC-WC tanpa LDPE dan campuran beraspal AC-WC dengan penambahan LDPE 3%, masing-masing direndam dalam air laut selama 0,5 jam, 24 jam, 36 jam, 48 jam, 60 jam, dan 72 jam lalu dilakukan pengujian marshall. Hasil penelitian menunjukkan bahwa penambahan LDPE sebesar 3% dapat meningkatkan stabilitas campuran beraspal, menjaga nilai *marshall quotient* (MQ), dan memperlambat penurunan nilai *flow* akibat perendaman. Seluruh nilai volumetrik marshall (VIM, VMA, VFB) berada dalam rentang spesifikasi yang dipersyaratkan. Campuran beraspal dengan penambahan plastik LDPE 3% dapat mempertahankan nilai sisa stabilitas sesuai spesifikasi hingga 60 jam perendaman, sedangkan campuran tanpa penambahan plastik tersebut hanya dapat bertahan hingga 36 jam. Dengan demikian, pemanfaatan limbah plastik LDPE sebagai bahan aditif dalam campuran beraspal AC-WC dapat menjadi solusi alternatif yang efektif untuk meningkatkan ketahanan campuran beraspal dalam menghadapi lingkungan ekstrem serta mendukung pengelolaan limbah plastik secara berkelanjutan.

Kata kunci: Campuran beraspal AC-WC, plastik LDPE, karakteristik marshall, banjir rob

MARSHALL CHARACTERISTICS OF AC-WC ASPHALT MIX WITHOUT AND WITH THE ADDITION OF LOW DENSITY POLYETHYLENE (LDPE) PLASTIC WASTE AT VARIOUS DURATIONS OF SEAWATER SOAKING

ABSTRACT

One of the causes of road damage in coastal areas of Indonesia is tidal flooding which results in seawater inundation that reduces the quality and service life of asphalt pavements. The accumulation of plastic waste, particularly Low-Density Polyethylene (LDPE), continues to increase and remains inadequately managed on the other hand. This study aims to evaluate the marshall characteristics of AC-WC asphalt mixtures with the addition of 3% LDPE waste under various seawater immersion durations. The dry mixing method was employed, and the Marshall tests were conducted in accordance with SNI 2489 2018 and the General Specifications of Bina Marga 2018. Two types of asphalt mixtures were tested: conventional AC-WC and AC-WC with 3% LDPE addition, each immersed in seawater for 0.5, 24, 36, 48, 60, and 72 hours before being subjected to marshall testing. The results indicate that the addition of 3% LDPE increases the stability of the asphalt mixture, maintains the marshall quotient (MQ), and slows the decline in flow value due to immersion. All volumetric marshall parameters (VIM, VMA, VFB) remained within the specified standard range. The asphalt mixture with 3% LDPE was able to maintain residual stability values within specifications up to 60 hours of immersion, whereas the conventional mixture only met the requirements up to 36 hours. Therefore, the use of LDPE plastic waste as an additive in AC-WC asphalt mixtures can be considered an effective alternative solution to enhance the durability of asphalt under extreme environmental conditions while supporting sustainable plastic waste management.

Keywords: AC-WC asphalt mixture, LDPE plastic, Marshall characteristics, tidal flooding