

PENGARUH GENANGAN AIR TERHADAP KERUSAKAN JALAN ASPAL (AC-BASE)

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Abstrak

Jalan raya merupakan infrastruktur dalam mendukung pergerakan ekonomi, namun rentan mengalami kerusakan akibat genangan air. Penelitian ini bertujuan menganalisis pengaruh genangan air terhadap kinerja campuran AC-Base melalui pengujian Marshall. Dengan Kadar Aspal Optimum (KAO) didapat sebesar 6,0% berdasarkan pengujian lima variasi kadar aspal 4,0%–6,0%. Pengujian dilakukan pada tiga kondisi : tanpa perendaman, perendaman air biasa, dan perendaman air panas 60°C. Pada perendaman air biasa, stabilitas menurun signifikan dari 2635,59 kg 1 hari menjadi 2126,43 kg 7 hari dan 1668,44 kg 30 hari, meskipun masih memenuhi spesifikasi minimum 1800 kg. Marshall Quotient MQ turun dari 846,03 kg/mm menjadi 470,88 kg/mm, VIM meningkat dari 3,94% menjadi 7,75% melebihi batas maksimum 5%, dan VFA turun dari 76,57% menjadi 61,59% di bawah minimum 65%, menunjukkan degradasi ikatan aspal-agregat. Sebaliknya, pada tanpa perendaman, stabilitas meningkat dari 1837,96 kg 1 hari menjadi 2238,07 kg 30 hari, menandakan penguatan struktur. Untuk perendaman air panas, stabilitas tetap tinggi: 2623,13 kg 30 menit dan 2433,62 kg 60 menit, dengan MQ mencapai 880,38 kg/mm 30 menit dan VFA 74,59%, menunjukkan penetrasi aspal yang optimal. Penemuan ini menegaskan bahwa genangan air jangka panjang merusak kinerja campuran aspal, maka dibutuhkan sistem drainase yang baik dan perlakuan termal dapat memperpanjang umur jalan.

Kata Kunci: Genangan air, AC-Base, Marshall Test, Kadar Aspal Optimum, Kerusakan Jalan.

THE EFFECT OF WATERLOGGING ON ASPHALT ROAD DAMAGE (AC-BASE)

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Abstrak

Highways are critical infrastructure for supporting economic mobility, yet they are vulnerable to damage caused by waterlogging. This study aims to analyze the effect of water ponding on the performance of Asphalt Concrete–Base (AC-Base) mixtures through Marshall testing. The Optimum Asphalt Content (OAC) was determined to be 6.0% based on testing five asphalt content variations 4.0%–6.0%. The tests were conducted under three conditions: without soaking, soaking in room-temperature water, and soaking in hot water 60°C. For room-temperature water soaking, stability significantly decreased from 2,635.59 kg 1 day to 2,126.43 kg 7 days and 1,668.44 kg 30 days, although still meeting the minimum specification of 1,800 kg. The Marshall Quotient (MQ) dropped from 846.03 kg/mm to 470.88 kg/mm, VIM increased from 3.94% to 7.75% exceeding the maximum limit of 5%, and VFA decreased from 76.57% to 61.59% below the minimum of 65%, indicating degradation of the asphalt-aggregate bond. Conversely, in the without-soaking condition, stability increased from 1,837.96 kg 1 day to 2,238.07 kg 30 days, indicating structural strengthening over time. For hot water soaking, stability remained high at 2,623.13 kg 30 minutes and 2,433.62 kg 60 minutes, with MQ reaching 880.38 kg/mm 30 minutes and VFA at 74.59%, indicating optimal asphalt penetration and strong bonding. These findings confirm that prolonged waterlogging degrades asphalt mixture performance, emphasizing the need for effective drainage systems and potential thermal treatments to extend pavement service life.

Keywords: *Water Ponding, AC-Base, Marshall Test, Optimum Asphalt Content, Pavement Damage*