

THE EFFECT OF SEAWATER IMMERSION ON DAMAGE TO AC-BC ASPHALT ROADS

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Abstract

Highways are vital infrastructure supporting economic mobility, but they are vulnerable to damage from seawater inundation, particularly in coastal areas. This study aims to analyze the effect of seawater inundation on the damage of AC-BC asphalt roads through continuous immersion testing, taking into account material characteristics and coastal environmental conditions. All constituent materials, including coarse aggregate, fine aggregate, filler, and asphalt, meet the 2018 Bina Marga technical specifications. Tests were conducted on mixtures with varying asphalt content (4%–6%) to determine the optimal content and evaluate resistance to immersion and high temperatures. The results showed that an asphalt content of 5.5% was the only one that met all standard Marshall parameters, such as stability (1401,73 kg), flow (3,5 mm), Marshall Quotient (MQ) (403,86 kg/mm), VMA (15,27%), VITM (3,01%), and VFWA (74,73%). Seawater immersion tests indicated that seawater immersion and temperature negatively impacted the stability and durability of the mixture. Stability decreased from 2458,82 to 2430,35 kg and MQ from 921,65 to 677,88 during 30 days of immersion, while flow increased, indicating softening of the mixture. Significant changes also occurred in the void values, including an increase in VITM from 5,82% to 5,18% indicating an increase in water-filled pores and a decrease in intergranular adhesion. These findings confirm that prolonged water exposure accelerates the structural degradation of asphalt mixtures in the long term, so drainage planning and selection of waterproofing materials are very important in road construction and coastal road maintenance.

Keywords: *AC-BC, Immersion Test, Marshall Characteristics, Waterlogging.*