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Perancangan Campuran AC-WC dengan Reclaimed Asphalt Pavement (RAP) 30% Menggunakan Rejuvenator Iterlene
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INTISARI

Sebagai material daur ulang, penggunaan *Reclaimed Asphalt Pavement* (RAP) memiliki potensi untuk meningkatkan keberlanjutan dalam konstruksi jalan. Namun kandungan aspal tua dalam RAP mempengaruhi karakteristik campuran. Upaya yang dapat dilakukan yaitu menggunakan bahan peremaja untuk memulihkan sifat aspal RAP. Penelitian ini melakukan analisis dan evaluasi pengaruh penggunaan *rejuvenator Iterlene* terhadap karakteristik Marshall dan volumetrik campuran *Asphaltic Concrete-Wearing Course* (AC-WC) dengan kadungan RAP 30%.

Penelitian ini dilakukan secara eksperimental pengujian langsung pada laboratorium. Karakterisasi material RAP dilakukan dengan pengujian ekstraksi, *recovery binder*, penetrasi, titik lembek, dan berat jenis. Perancangan campuran AC-WC RAP mengikuti acuan berdasarkan Spesifikasi Khusus Interim Bina Marga 2019 (SKh-1.6.27) dengan menentukan kebutuhan aspal tambahan dan kadar *rejuvenator Iterlene* untuk campuran. Evaluasi kinerja campuran dianalisis berdasarkan hasil pengujian Marshall dan parameter volumetrik yang meliputi *Void in Mix* (VIM), *Void in Mineral Aggregate* (VMA), dan *Void Filled with Asphalt* (VFA).

Hasil penelitian menunjukkan bahwa campuran AC-WC RAP 30% dengan *rejuvenator Iterlene* memenuhi persyaratan Marshall dan volumetrik berdasarkan Spesifikasi Umum Bina Marga 2020. Penggunaan RAP memengaruhi karakteristik campuran, terutama terhadap kebutuhan kadar aspal optimum (KAO) dan perilaku volumetriknya. Campuran RAP memiliki nilai KAO sebesar 6,4%, lebih tinggi dibandingkan campuran kontrol sebesar 5,9%. Meskipun demikian, penggunaan *rejuvenator* membantu menjaga keseimbangan karakteristik campuran sehingga campuran tetap memenuhi persyaratan spesifikasi. Selain itu, aktivasi kembali *binder* yang masih terkandung dalam RAP memungkinkan pemanfaatan material RAP secara lebih efektif, sehingga kebutuhan agregat baru dan *virgin binder* dapat dikurangi. Berdasarkan hasil penelitian, penggunaan RAP 30% dengan *rejuvenator Iterlene* berpotensi menjadi alternatif dalam mendukung pemanfaatan material daur ulang pada konstruksi perkerasan jalan.

Kata kunci: Daur Ulang, Bahan Peremaja, *Asphalt Concrete-Wearing Course*, Karakteristik Marshall, Kadar Aspal Optimum.

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ABSTRACT

As a recycled material, the usage of Reclaimed Asphalt Pavement (RAP) offers potential to improve the sustainability in road pavement construction. Although, the aged binder contained in RAP may affect the characteristics of the asphalt mixture. One approach as an attempt to this issue, is the application of rejuvenating agents to restore the propertie of the aged binder. This research was conducted to analyze and evaluate the effect of Iterlene rejuvenator on the Marshall characteristics and volumetric properties of Asphaltic Concrete-Wearing Course (AC-WC) mixtures containing 30% RAP.

This research is conducted through direct experimental testing with laboratory approach. RAP characterization is performed through extraction, binder recovery, penetration, softening point, and specific gravity test. The AC-WC mixture design was developed in accordance with the Interim Special Specifications of Bina Marga 2019 (SKh-1.6.27) procedures, by determining the required assitional asphalt content and optimum dosage of Iterlene rejuvenator. The performance of the mixture was evaluated using Marshall testing and volumetric analysis, including Void in Mix (VIM), Void in Mineral Aggregate (VMA), and Void Filled with Asphalt (VFA).

The results showed that the AC-WC mixture containing 30% RAP and Iterlene rejuvenator satisfied the Marshall and volumetric requirements specified in the 2020 Bina Marga General Specifications. The incorporation of RAP affected the mixture characteristics, particularly the Optimum Asphalt Content (OAC) and volumetric behavior. The RAP mixture exhibited an OAC of 6.4%, which was higher than that of the control mixture at 5.9%. Nevertheless, the addition of the rejuvenator helped maintain a balance between the Marshall and volumetric characteristics, allowing the mixture to comply with the specification requirements. Furthermore, the reactivation of the aged binder contained in RAP enabled a more effective utilization of recycled materials, thereby reducing the demand for new aggregates and virgin binder. Overall, the findings indicate that the use of 30% RAP with Iterlene rejuvenator can be considered a promising alternative for supporting the application of recycled materials in sustainable pavement construction.

Keywords: *Reclaimed Asphalt Pavement* (RAP), *Rejuvenating Agents, Asphalt Concrete-Wearing Course*, Marshall charcteristics, *Optimum Asphalt Content.*