

## ABSTRAK

Berdasarkan permasalahan dilapangan, perkerasan jalan harus direkonstruksi sesuai dengan umur rencana karena perkerasan jalan yang melebihi umur rencana jalan tersebut akan semakin tumbuh dan mengalami kerusakan, solusi dalam pemeliharaan dan perbaikan jalan agar tingkat pelayanannya tetap terjaga yaitu dengan melakukan pengupasan/pengerukan perkerasan aspal lama yang kemudian dilapisi kembali dengan perkerasan aspal baru (*overlay*). Hasil dari pengerukan aspal lama disebut dengan RAP. Dari penelitian yang sudah dilakukan biasanya RAP dicampurkan dengan HMA namun pada penelitian ini RAP tersebut dicampurkan dengan CMA, salah satu keunggulan CMA karena tidak memerlukan proses pemanasan agregat. Tujuan dari penelitian ini yaitu mengetahui pengaruh RAP pada karakteristik *Marshall* dan pengaruh RAP terhadap nilai kuat tarik tidak langsung.

Metode penelitian meliputi pengujian material, *mix design* campuran untuk mencari KARO, selanjutnya *mix design* memakai variasi bahan RAP pada campuran sebesar 0%, 25%, 50%, 75% dan 100% RAP. Kemudian dilakukan pemeriksaan persentase rongga terhadap benda uji untuk memperoleh nilai *density*, VMA, VFA dan VIM selanjutnya dilakukan pengujian dengan alat *Marshall* untuk mendapatkan nilai stabilitas, *flow* dan *Marshall Quotient* (MQ) dan dilakukan pengujian untuk mengetahui nilai kuat tarik tidak langsung dengan alat uji ITS modifikasi.

Hasil penelitian *properties Marshall* dan ITS campuran dingin aspal emulsi menggunakan variasi bahan RAP dan *fresh aggregate*, bahwa variasi bahan RAP pada campuran dapat meningkatkan nilai *density* dan menurunkan rongga udara hal tersebut dibuktikan oleh nilai VIM dan VMA yang semakin rendah dan nilai VFA yang semakin tinggi serta menurunkan nilai *Marshall Quotient* dan nilai kuat tarik tidak langsung. Hal tersebut dibuktikan dengan data hasil penelitian yaitu 0% RAP menghasilkan nilai *density* sebesar 2,08 gr/cc, VMA 33,62%, VIM 9,24%, VFA 72,53%, nilai stabilitas 1237,45 kg, *flow* 3,50 mm, MQ 353,56 kg/mm, dan nilai ITS 204,73 kPa. 25% RAP menghasilkan nilai *density* sebesar 2,11 gr/cc, VMA 33,58%, VIM 8,86%, VFA 73,62%, nilai stabilitas 1140,94 kg, *flow* 3,55 mm, MQ 321,55 kg/mm, dan nilai ITS 196,57 kPa. 50% RAP menghasilkan nilai *density* 2,11 gr/cc, VMA 33,47%, VIM 8,79%, VFA 73,73%, nilai stabilitas 1095,34 kg, *flow* 3,83 mm, MQ 266,91 kg/mm dan nilai ITS 192,49 kPa. 75% RAP menghasilkan nilai *density* 2,12 gr/cc, VMA 32,40%, VIM 7,65%, VFA 76,40%, nilai stabilitas 1043,03 kg, *flow* 3,90 mm, MQ 253,30 dan nilai ITS 186,21 kPa. 100% RAP menghasilkan nilai *density* 2,15 gr/cc, VMA 32,25%, VIM 7,06%, VFA 78,11%, nilai stabilitas 871,89 kg, *flow* 3,95 mm, MQ 212,21 kg/mm dan nilai ITS 177,64 kPa. Secara keseluruhan campuran dingin tersebut tidak semuanya memenuhi spesifikasi untuk pembuatan lapis aus permukaan jalan.

**Kata Kunci :** *Cold Mix Asphalt*, Aspal emulsi, RAP, AC-WC, *Fresh aggregate*, *Marshall*, ITS

## ABSTRACT

*Based on the problems in the field, the road pavement must be reconstructed according to the design age because the road pavement that exceeds the planned life of the road will grow and experience damage, the solution in road maintenance and repair so that the service level is maintained is by stripping / dredging the old asphalt pavement which is then carried out. re-coated with new asphalt pavement (overlay). The result of dredging the old asphalt is called RAP. From the research that has been done, usually RAP is mixed with HMA, but in this study RAP was mixed with CMA, one of the advantages of CMA because it does not require a heating process. The purpose of this study is to determine the effect of RAP on Marshall characteristics and the effect of RAP on the value of indirect tensile strength.*

*The research method includes material testing, mix design mix to find KARO, then mix design using variations of RAP material on a mixture of 0%, 25%, 50%, 75% and 100% RAP. Then, an examination of the percentage of voids was carried out on the test object to obtain the values of density, VMA, VFA and VIM, then tested with the Marshall tool to obtain the value of stability, flow and Marshall Quotient (MQ) and was tested to determine the value of indirect tensile strength with the ITS test equipment modification.*

*The results of research on properties of Marshall and ITS cold mix asphalt emulsion using variations of RAP and fresh aggregate materials, that variations in RAP material in the mixture can increase the density value and reduce air voids, this is evidenced by the lower VIM and VMA values and higher VFA values and reduce the value of Marshall Quotient and the value of indirect tensile strength. This is evidenced by the research data, namely 0% RAP resulting in a density value of 2.08 gr/cc, VMA 33.62%, VIM 9.24%, VFA 72.53%, stability value 1237.45 kg, flow 3, 50 mm, MQ 353.56 kg/mm, and ITS value of 204.73 kPa. 25% RAP produces a density value of 2.11 gr/cc, VMA 33.58%, VIM 8.86%, VFA 73.62%, stability value 1140.94 kg, flow 3.55 mm, MQ 321.55 kg /mm, and the ITS value is 196.57 kPa. 50% RAP produces a density value of 2.11 gr/cc, VMA 33.47%, VIM 8.79%, VFA 73.73%, stability value 1095.34 kg, flow 3.83 mm, MQ 266.91 kg/ mm and the ITS value is 192.49 kPa. 75% RAP produces a density value of 2.12 gr/cc, VMA 32.40%, VIM 7.65%, VFA 76.40%, stability value 1043.03 kg, flow 3.90 mm, MQ 253.30 and ITS value 186 ,21 kPa. 100% RAP produces a density value of 2.15 gr/cc, VMA 32.25%, VIM 7.06%, VFA 78.11%, stability value 871.89 kg, flow 3.95 mm, MQ 212.21 kg/ mm and the ITS value is 177.64 kPa. Overall, these cold mixtures do not all meet the specifications for the manufacture of road surface wear.*

**Keywords :** Cold Mix Asphalt, Asphalt emulsion, RAP, AC-WC, Fresh aggregate, Marshall, ITS