



Project Number
BEC79

Project Manager
Greg Sholar
State Materials Office

Principal Investigator
Fan Yin, Ph. D., P.E.
National Center for Asphalt
Technology at Auburn University

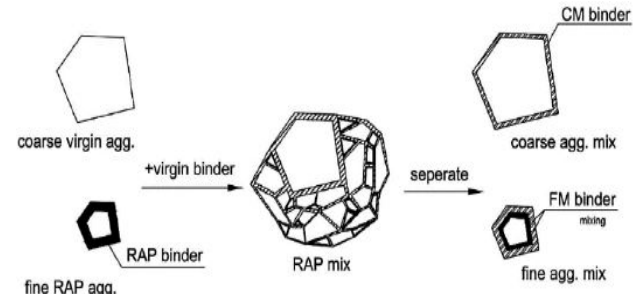
Florida Department of Transportation Research

Determining the Effect on Asphalt Mixture Performance by Increasing New Asphalt Binder Content Due to Inactive RAP Binder in the Mixture

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Current Situation

The Florida Department of Transportation (FDOT) uses reclaimed asphalt pavement (RAP) to save costs and conserve resources. But when RAP is included in mixtures, some of its asphalt binder is “inactive” and does not contribute to the mixture’s performance—this can lead to reduced durability and increased cracking in the pavement. The challenge is to balance the use of RAP while maintaining the quality of the asphalt mixture.



The research discussed different test methods to evaluate the recycled binder availability of RAP/RAS in recycled mixtures. For the extracted binder testing of coarse-aggregate and fine-RAP aggregate, the mixes were separated using a sieve and then the asphalt binder was tested to determine the RBA of the mixture.

Research Objectives

The objective of this project was to determine the impact of adding more virgin asphalt binder to compensate for the inactive portion of RAP binder in asphalt mixtures. Specifically, it sought to identify how increasing the amount of virgin binder affects cracking resistance, rutting resistance, and the overall durability of the mixtures. Another key objective was to develop practical recommendations for implementing the findings of this research into FDOT’s asphalt mixture design process.

Project Activities

The Auburn University research team began with a literature review to select an appropriate value for the recycled binder availability (RBA), which refers to the amount of RAP binder that actively contributes to the mixture. Based on this review, 80 percent was selected as the RBA value for Florida RAP mixtures, meaning that 80 percent of the RAP binder is “active,” while the remaining 20 percent is inactive.

The next step involved laboratory testing of RAP mixtures with varying levels of virgin binder. Tests included evaluating cracking resistance, rutting resistance, and durability using several methods, such as the Indirect Tensile Asphalt Cracking Test (IDEAL-CT) and the Hamburg Wheel Tracking Test (HWTT). Additionally, the research included a cost-benefit analysis to assess the financial impact of adding more virgin binder to RAP mixtures.

Project Conclusions and Benefits

Adding more virgin binder improved the cracking resistance and durability of RAP mixtures but slightly reduced their rutting resistance, especially for mixtures with higher RAP content (40 percent). However, the 20 percent RAP mixtures showed a good balance between cracking and rutting resistance, especially when using a performance-grade binder. The cost-benefit analysis revealed that even a small extension in pavement life could offset the additional costs of adding more virgin binder.

Based on the results, the project recommended FDOT adopt an 80 percent RBA for mix design and production of RAP mixtures to enhance the long-term performance of asphalt pavements in Florida. Implementing these changes can lead to more durable roads, reduced maintenance costs, and a better balance between cracking and rutting resistance.

For more information, please see fdot.gov/research.