

Use of Recycled Roofing Shingles in Hot Mix Asphalt Pavements

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EXTENDED ABSTRACT

The objective of this paper is to investigate the feasibility of using roofing shingles (tear-offs and manufacture defective shingles) as a substitute for virgin materials in the construction of new pavements.

Approximately 11 million tons of waste shingles are produced in the U.S. alone most of which are being deposited into landfills; however, when analyzing what we are actually dumping into landfills, it must be noted that most shingles have roughly a 20% liquid asphalt content per shingle. Using these numbers in calculations, the amount of asphalt material that is getting disposed of comes to total around 2.2 million tons which is quite significant in light of the current price of \$500 per ton for virgin binder and that the U.S. places roughly 700 million tons of asphalt every year.

With this cost efficiency in mind, the world's depleting virgin asphalt reserves, increasingly stricter environmental regulations, an increasing public awareness of our adverse effects from years of mounting waste disposals into landfills, and the useful benefits related to using recycled asphalt binder, the use of roofing shingles can be a sustainable solution for not only both waste management and road industries but for everyone who will benefit from a less hazardous environment. This could as stated, result in significant economic and environment impact in that less virgin petroleum or crude oil would have to be bought and countless tons of roofing shingle waste would not end up filling landfills.

Currently, most of the States Departments of Transportation allow around 5% of shingles be included in the surface mix. However, States Departments of Transportation are emphasizing the potential increase of percentages of recycled shingles in new paving mixture to enhance pavement sustainability. The main concern with use of shingles is that the resultant paving mixture becomes stiffer. Stiff mixtures are hard to place and compact, they also become more susceptible to low temperature cracking. Currently there is no comprehensive study on the feasibility of using high percentages of shingles in pavement.

Therefore, there is a need for a more in-depth study on the characteristics of shingles and their effects on paving mixtures. To address this concern, this paper investigates the rheological characteristics of the asphalt binder in shingles as well as the physio-chemical interaction between shingles and other constituents in asphalt pavements. The result of this study can help reduce the restrictions and limitations placed on how much recycled shingles can be used in new paving mixtures.