Effect of Cement and Lime on Performance Properties Cold Recycling Asphalt Mixtures with SBS Modified Emulsion

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ABSTRACT

Asphalt recycling has many benefits among which the preservation of natural resources, saving cost and energy can be mentioned. Although hot recycled mixtures are more durable and resistant compared to cold mixtures, using heat causes environmental pollution and toxic and hazardous gas emission and reduce workers safety. Therefore, there is a need to use additives in recycled asphalt mixtures for increasing durability and resistance of mixtures.
Using additives increases construction cost, but if we consider increasing pavement life cycle as one of the advantages from precise additives consuming, it would be justifiable.
So far, for the three reasons of higher void content, weak early life strength and long curing times, hot mixes were preferred to cold mix asphalts. On the other hand cold mixes are produced in more simple way and their characteristics are suitable for low to medium traffic conditions.
All over the world there are many projects used bitumen emulsion for cold in-place recycling (CIR) with good results. However, some emulsion CIR projects reported rutting, thermal cracking and asphalt stripping problems, caused to use additives to decrease rutting and emulsion CIR pavement distresses.
In recent researches cement, lime, fly ash and SBS modified bitumen emulsion have been used to improve the performance of recycling mixtures including durability, cracking resistance and resistance to moisture. Since limited researches have been conducted to investigate the effect of additives on the recycled asphalt mixtures properties, in this research cement and lime used as additives in CIR mixtures. We used cement and lime in the form of powder and SBS as additive with or without cement and lime to evaluate the effect of each additive on the mechanical properties such as Marshall Stability, durability, resilient modulus and permanent deformation.

Results indicate that cement and lime improve the performance properties of emulsion CIR mixtures. Furthermore, SBS with cement and lime show same results.

Keywords: Cold Recycling, Bitumen Emulsion, Cement, Lime, SBS