

Effect of bottom ash and limestone on the optimum binder content in Hot Mix Asphalt (HMA)

Abstract

One of the most effective and simplest methods to minimize waste as well as reduce the environmental problems associated with waste disposal is by utilizing waste materials as a cement replacement in hot mix asphalt (HMA) mixtures which can provide the same or better stability as the conventional method. Fillers play an important role in the stability and strength of the pavement by filling voids between the aggregate particles in the performance of the HMA mixture. This research investigated the effect of the utilization of different types of filler (bottom ash and limestone) on the optimum binder content of HMA. Flow, stability, stiffness, air void in mix (VIM) and void filled with bitumen (VFB) were determined using the Marshall Method test in order to determine the optimum binder content of HMA for all mineral filler. The results of the Marshall test for each filler have been compared with the JKR standard specification. The optimum binder content for bottom ash, limestone and Ordinary Portland Cement (OPC) was 5.42%, 5.65% and 5.54%, respectively. All values of mineral filler used meet the JKR standard specification, where the range is between 4 and 6%. From the result achieved, the bottom ash has the lower optimum binder content value compared to the limestone and OPC. When the lower binder content is used in the bituminous mixture, the cost for pavement construction will be reduced.

Keywords

Bottom ash; Hot mix asphalt; Limestone; Mineral filler; Optimum binder content