

## Investigating the Potential for Introduction of Warm Mix Asphalt in Kuwait Using the Volcanic Ash

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**Abstract :** The current applied asphalt technology for Kuwait roads pavement infrastructure is the hot mix asphalt (HMA) pavement, including both pen grade and polymer modified bitumen (PMBs), that is produced and compacted at high temperature levels ranging from 150 to 180 °C. There are no current specifications for warm and cold mix asphalts in Kuwait's Ministry of Public Works (MPW) asphalt standard and specifications. The process of the conventional HMA is energy intensive and directly responsible for the emission of greenhouse gases and other environmental hazards into the atmosphere leading to significant environmental impacts and raising health risk to labors at site. Warm mix asphalt (WMA) technology, a sustainable alternative preferred in multiple countries, has many environmental advantages because it requires lower production temperatures than HMA by 20 to 40 °C. The reduction of temperatures achieved by WMA originates from multiple technologies including foaming and chemical or organic additives that aim to reduce bitumen and improve mix workability. This paper presents a literature review of WMA technologies and techniques followed by an experimental study aiming to compare the results of produced WMA samples, using a water containing additive (foaming process), at different compaction temperatures with the HMA control volumetric properties mix designed in accordance to the new MPW's specifications and guidelines.

**Keywords :** warm-mix asphalt, water-bearing additives, foaming-based process, chemical additives, organic additives

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