

An initial investigation of the use of local industrial wastes and by-products as mineral fillers in stone mastic asphalt pavements

ABSTRACT

Environmental awareness of the drawbacks of landfill sites is forcing nations to look for better ways to recycle and Increase usage of industrial wastes and by-products will both decrease the demand for available materials and help solve many disposal problems. The use of industrial wastes and by-products as Mineral fillers in asphalt mixtures is not a new technique. Mineral Fillers have been used in road construction for many years. They are incorporated in asphalt mixtures to enhance the properties and performance of asphalt concrete pavements. Mineral fillers vary in mineralogy, chemical properties, shape and texture, size, and gradation. The major objective of this initial investigation was to find out whether it is possible to use the local industrial and by-products wastes such as Steel slag, Ceramic waste, Coal fly ash, limestone, and Rejected ceramic raw material as mineral fillers in Stone Mastic Asphalt (SMA) mixtures in Malaysia. Chemical analysis using Scanning Electro Microscope (SEM), Energy Dispersive X-ray (EDX) and physical tests were performed on those local industrial and by-products wastes specimens to determine its chemical composition, size and shape of particles, as well as gradation and specific gravity, and were compared to limestone dust the common type of mineral filler used in Stone Mastic Asphalt in Malaysia. The test results indicate that the physical and chemical properties of the local industrial wastes are within specified limits of quality requirements for mineral filler for Bituminous Paving Mixtures AASHTO M17, and in accordance with AASHTO PP41 (Designing of Stone Matrix Asphalt) and these waste materials can potentially be used as mineral fillers in Stone Mastic Asphalt (SMA) Mixtures.

Keyword: Industrial wastes; Mineralogy; Chemical properties; Mineral filler; SMA pavement mixtures