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Patent Search

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Abstract:

The invention discloses a modified Warm Mix Asphalt (WMA) composition incorporating crumb rubber derived from waste tires and calcium hydroxide [Ca(OH)₂] to enhance mechanical performance, durability, and sustainability. The composition includes VG-30 bitumen, coarse and fine aggregates, mineral filler, and optional zeolite additive for temperature reduction. Crumb rubber improves elasticity and rutting resistance, while Ca(OH)₂ enhances binder-aggregate adhesion and moisture resistance. The mixture is prepared and compacted at 100°C–140°C, reducing energy consumption and emissions compared to Hot Mix Asphalt. Experimental evaluation demonstrates increased Marshall Stability, reduced flow values, and improved fatigue life. The invention offers an eco-friendly, cost-efficient pavement material compatible with existing asphalt production facilities.

Complete Specification

Description:FIELD OF THE INVENTION

[001] The present invention pertains to the domain of civil and transportation engineering, more specifically to the field of pavement materials and asphalt technology. It relates to a modified Warm Mix Asphalt (WMA) composition incorporating crumb rubber derived from waste tires and calcium hydroxide (Ca(OH)₂) as performance-enhancing additives. The invention focuses on improving the mechanical strength, fatigue resistance, and moisture durability of asphalt mixtures while promoting environmental sustainability through reduced mixing and compaction temperatures, lower greenhouse gas emissions, and the reuse of recycled materials.

BACKGROUND OF THE INVENTION

[002] The construction and maintenance of durable, cost-effective, and environmentally sustainable pavements remain one of the primary challenges in modern civil infrastructure. Conventional Hot Mix Asphalt (HMA) has been widely used due to its proven performance and ease of application; however, its production requires high mixing and compaction temperatures, typically ranging between 150°C and 180°C. These elevated temperatures lead to increased fuel consumption, higher greenhouse gas emissions, accelerated aging of the asphalt binder, and potential health hazards for workers exposed to heat and fumes during construction. Moreover, the dependence on virgin raw materials and the limited incorporation of recycled constituents in conventional asphalt formulations further amplify the environmental footprint of the paving industry.

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