

C-50: Effect of hydrated lime on the durability of asphalt concrete

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Addition of a small quantity of hydrated lime to improve the resistance to water of asphaltic concrete is a common practice. Recently hydrated lime has been recognised as an effective additive to retard the oxidative hardening of asphaltic concrete on exposure to air.

Main objectives are to evaluate the response of hydrated lime with respect to water susceptibility, temperature sensitivity, strength characteristics and durability of asphaltic concrete, to determine the optimum and economically viable quantity of hydrated lime and to explore the most effective method of manufacturing asphaltic concrete.

Hydrated lime has been observed to arrest the degradative oxidation of asphalt by absorbing the polar oxidation products formed by such reactions to reduce the age hardening and improve the low temperature flow properties. Because of the stiffening and resistance to water attacks imparted by hydrated lime, rutting and allied problems of asphaltic concrete are minimised. A mechanism is proposed to explain the adsorption of calcium ions on the surface of siliceous aggregates.

Experiments were conducted by incorporating 0%, 1%, 2% and 4% hydrated lime by weight of bitumen/asphalt respectively. Results on softening point, viscosity, penetration index, temperature susceptibility durability, resistance to water, indirect tensile strength and fatigue life are presented.

The experimental results support that fresh hydrated lime: Lowers the temperature susceptibility; reduces flow, hence it is more resistant to rutting and permanent deformation; increases durability of asphaltic concrete; provides a remarkable resistance to water; increases indirect tensile strength of asphalt concrete; brings about a very significant increase in fatigue life, hence improves the serviceability.