INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title:
EVALUATION OF MODIFIED BINDERS AND MIXES WITH WARM MIX ASPHALT (WMA) ADDITIVES

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SHORT ABSTRACT

Warm mix asphalt (WMA) refers to the technologies meant for significantly reducing the mixing and compaction temperatures (collectively referred as production temperatures) of asphalt mixtures, and hence have the main advantages of cutting fuel consumption and decreasing the emissions of greenhouse gases. Meanwhile, the benefits of modified asphalt binders to cater for increasing traffic, severe axle loads, and unanticipated variations in pavement temperatures, are increasingly being recognized. However, increase in production temperatures associated with modified binders has been a long-felt concern related to their widespread use. The main aim of the study was to evaluate the modified binders and mixes with WMA additives, which was achieved through the following two broad objectives: (1) characterization of modified binders with different WMA additive types and dosages; (2) evaluation of properties of bituminous concrete mixes with different WMA additive type, WMA additive dosage, and reductions in production temperatures.

The present study included: two types of modified bitumen (polymer- and crumb rubber-modified bitumen); two types of WMA additives, *viz.* Evotherm (chemical additive) and Sasobit (organic additive); various dosage rates of selected WMA additives (Evotherm: 0.5%, 0.6%, and Sasobit: 1%, 2%, 3% by weight of binder); four reductions in production temperatures (0°C, 20°C, 30°C, and 40°C) from the standard production temperatures used for control HMA mixes, and one aggregate source. Warm asphalt binders were prepared with the combination of modified binder type, WMA additive type, and WMA additive dosage, and were evaluated for the rheological properties. Warm mixes were then prepared with the combination of modified binder type, WMA additive type, WMA dosage rate, and reductions in the production temperatures. Warm mixes were evaluated for volumetric, Marshall, moisture susceptibility, resilient modulus, rutting, and fatigue characteristics.