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Effect of Freeze-Thaw Cycles on the Properties of Asphalt Pavements in Cold Regions: A Review

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Abstract

Asphalt pavements weaken over time due to the effect of environment and heavy traffic loading on paving constituents. Rutting, fatigue cracking and low temperature cracking are the major distresses responsible for degradation of the pavement and consequently leads to the failure of flexible pavement. Asphalt pavement is directly exposed to atmosphere and hence, suffers the effects of weather, environment and automobiles. Apparently, for a new asphalt pavement, even though there is no vehicle loading or other artificial activities, deterioration can also appear under climate and environment effects. In recent years, thermal cracks and low temperature distresses have become key concern for asphalt pavements in cold regions. In case of rutting of asphalt mixtures, aggregate characteristics play an important role, whereas, the properties of binder are more related to fatigue. Although the properties of asphalt binder can have a great influence on the performance of pavement, the role of aggregate gradation cannot be ignored in providing resistance to rutting and reducing permanent deformation. Gradation has significant effects on asphalt mixture's Freeze-Thaw (F-T) durability. This paper reviews research conducted on the various properties viz., fatigue, rutting, air voids, compressive strength, etc. of bituminous mixes which are under the influence of F-T cycles. This paper also discusses the effect of F-T cycles on stability of bituminous mixes.*

Keywords: Freeze-thaw; flexible pavement; fatigue, rutting, asphalt concrete.

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