EFFECT OF MAT THICKNESS FOR THE DEGREE OF COMPACTION OF ASPHALT PAVEMENTS

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Degree of Master of Engineering

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DECLARATION OFTHE CANDIDATE AND SUPERVISOR

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ABSTRACT

Effect of Mat Thickness for the Degree of Compaction of Asphalt Pavements

Compaction of the hot mix asphalt (HMA) is very important process in the road construction. The ability of the load bearing is greatly dependent on the degree of compaction of the hot mix asphalt pavements (Finn, & Epps, 1980). The degree of compaction depends on the various factors. The thickness of the hot mix asphalt mat is a major factor that affects to the degree of compaction. Temperature of the hot mix asphalt is very much important for the proper compaction. It is mainly governed by the layer thickness. According to previous researches, it has been shown that low thicknesses layers are rapidly drop down its temperature rather than the high thicknesses layers.

This research aims at finding out, what is the optimum mat thickness of the asphalt pavements, which is suitable for the Sri Lankan conditions.

In the compaction process of the hot mix asphalt layers, maximum aggregate size affects the layer thickness. 2.5 times of the maximum aggregate size has been considered as the optimal thickness for the asphalt layer. According to the guidelines of the Road Development Authorities (Sri Lanka), most of the asphalt pavements are constructed with a 50mm or lesser (40-50mm) thick layers.

For this study, four road projects were selected to find out the optimum mat thickness. Thicknesses of the asphalt cores and their degree of compactions were obtained from the above projects. The cores collected in a certain range of breakdown temperatures were selected to maintain the uniformity of the samples. Maximum day time temperature and average monthly velocity details were obtained from the Department of Meteorology. The graph of core thicknesses versus degree of compaction is plotted and optimum compaction range was estimated using the graph.

As per the study, it shows that, mat thicknesses within the range 55-60mm provide highest degree of compaction. It is recommended to have about 55-60mm thick mat thickness instead of having 50mm or lesser mat thicknesses to obtain highest degree of compaction of HMA layers for the selected environmental and laydown conditions.

Key words: Mat, thickness, hot mix asphalt, degree of compaction, maximum aggregate size, core sample

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LIST OF ABBREVIATIONS

HMA - Hot Mix Asphalt

ICTAD - Institute for Training and Development

VMA - Voids in Mineral Aggregates

VIM - Air Voids in Total Mix