

UNIVERSITI TEKNOLOGI MARA

**ENVIRONMENTAL EFFECT ON
THE TIME AVAILABLE FOR
COMPACTION OF WARM MIX
ASPHALT**

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MUSTAPA**

MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

High demand for new asphalt pavements often requires that paving is to be done in an unfavourable condition such as low air temperatures, high wind speeds, and night construction that will influence the cooling rate of asphalt pavements, affecting the Time Available for Compaction (TAC). TAC is the period taken by the asphalt mix to cool and stiff to the point where it can absorb the applied compaction energy without allowing the aggregate particles to move. This study was conducted with the aim to determine the appropriate TAC of Warm Mix Asphalt (WMA) which include the study parameters of wind speed, solar flux, base and ambient temperature, and rain intensity. Marshall mix design method was used for AC14 and AC28 mix type based on PWD Malaysia's specifications for Road Works. The liquid additive used to modify the binder to make the WMA samples was Cecabase. The volumetric properties were first determined together with the optimum cecabase content (OCC) of WMA. Then, the cooling rate of WMA was measured by investigating the environmental effects of wind speed, solar flux, base and ambient temperature, and also rain intensity. Temperature measurements were taken in the middle and the surface position of the slab samples. Relationship between environmental factors and TAC were developed. Based on the results obtained, the TAC of WMA decreased by 12-100% during windy, night and rainy condition compared to control samples, while TAC increased of up to 63% during daytime condition. It can be concluded that the cooling rate of WMA is significantly affected by the environmental factors and TAC.

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