

EMPIRICAL-MECHANISTIC EVALUATION OF ASPHALT PAVEMENT STRUCTURES COMPARING COMPUTERIZED TOOLS AND LABORATORY FATIGUE TEST DATA

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ABSTRACT

The main aim of this paper is to evaluate the mechanical performance of asphalt concrete pavement structures designed using the method adopted by the Brazilian National Department of Transportation Infrastructure (DNIT). This method adopts the conversion principle of traffic volumes generated from different intensities of load spectra to those related to an equivalent single axle load (ESAL) of 8.2tf. The traffic volume data used to design the relevant pavement structures was taken from research studies conducted by the Brazilian Military Institute of Engineering. These studies were concerned with a highway project, called BR-163, located in the Amazon Region. This highway would form an important route to transport the Brazilian soy produce for international exportation from Brazil's northern ports. From the traffic data, it was possible to obtain the strain levels generated in every layer of the various pavement structures, using computerized pavement design tools, such as ELSYM 5 and EVERSTRESS 5.0. Special analyses were developed for the bottom of the surface layers to compare traffic damage effect calculated by the DNIT empirical method and that provided by a laboratory fatigue equation. The fatigue equation comprised tensile microstrains generated by the 8.2tf ESAL and by a series of tandem axle loads ranging from 17.0 to 26.0tf.

KEY WORDS: Axle load, traffic volume, design, pavement, microstrain, fatigue.