Finite Element Model Analysis to Determine Improved Support Condition for Concrete Block Paved Low Volume Roads.

Gunarathna, W.P.H., Mampearachchi W.K

The intensive process of urbanization in the last century has caused a need for rapid construction of roads and related infrastructure in Sri Lanka. The rapid demand for better roads and services required the designers and the builders to introduce suitable construction methods in order to economize the construction as well as increase the durability. In Sri Lanka, large percentage of low volume roads has been constructed using gravel, concrete or bitumen as the primary material. Due to lack of maintenance of the roads in rural sector, Engineers are trying to find alternative cost effective pavement construction techniques.

Concrete block paving (CBP) is one of the predominant road construction methods used in most of the developing counties due to economic adaptability. This method can be emerged as a cost effective road construction method suitable for different ground conditions with low life cycle cost. However, this technique yet to be developed to a fully fledge road construction method in Sri Lanka. Therefore, standard set of guide lines are needed to maintain consistency and construction quality of block paving technology.

The aim of this research is to evaluate the state of support conditions for low volume roads and effective block laying patterns which can be used to obtained best performance from concrete block paving. Therefore verified three-dimensional (3-D) finite element model (using SAP2000 structural analysis software) was used to measure elastic deflection behavior of concrete block pavement for low volume roads. Developed design chart can be used for subgrade improvements for low volume roads condition and find best laying arrangement in the concrete block paving to obtain most excellent interlocking action.

Key words: Finite Element Model, Concrete block paving, low volume roads, Elastic behavior, Surface Deflection, Block laying Pattern