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## Cracking of open traffic rigid pavement

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**Abstract.** The research is done by observing the growth of real structure cracking in Natar, Lampung, Indonesia compared to C. Niken's et al research and literature study. The rigid pavement was done with open traffic system. There are two main crack types on Natar rigid pavement: cracks cross the road, and cracks spreads on rigid pavement surface. The observation of cracks was analyzed by analyzing material, casting, curing, loading and shrinkage mechanism. The relationship between these analysis and shrinkage mechanism was studied in concrete micro structure. Open traffic make hydration process occur under vibration; therefore, fresh concrete was compressed and tensioned alternately since beginning. High temperature together with compression, cement dissociation, the growth of  $Ca^{2+}$  at very early age leads abnormal swelling. No prevention from outside water movement leads hydration process occur with limited water which caused spreads fine cracks. Limited water improves shrinkage and plastic phase becomes shorter; therefore, rigid pavement can't accommodate the abnormal swelling and shrinking alternately and creates the spread of cracks. Discontinuing casting the concrete makes both mix under different condition, the first is shrink and the second is swell and creates weak line on the border; so, the cracks appear as cracks across the road.

### 1 Introduction

Rigid pavements generally are made from concrete, with or without reinforcement. Rigid pavement lays over sub base and sub grade as shown in Figure 1. Sub base can be made from lean concrete or stone structure. Over the past few years, the reliance has shifted more to rigid pavement because of its low maintenance cost. Lane

rigid pavement leads to concrete deterioration, micro cracks and wider cracks.

There are many types of cracks such as the tearing of concrete through paver, plastic shrinkage cracking at pavement surface, map cracking (craze cracks), transfer and oblique cracks within the panel, random longitudinal cracks within the panel, corner cracks (break at panel corner), random transverse cracks at or near transverse

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