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Deep-hair-cracks mechanism of rigid pavement in humid tropical weather

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Abstract. This research aims to find the cause of deep hair crack in the rigid pavement. This research was done by the observation on a real rigid pavement in Lampung, Indonesia. Rigid pavement length is 39.4 km with four lanes. The length was divided into segments, in which every segment is 39.4 km with four lanes. The length was divided into segments, in which every segment is 5m × 4.6m. The total segments are 31520. The thickness of the rigid pavement is 30 cm with a flexural strength of 45 MPa. The base of the rigid pavement is lean concrete with 10 cm depth and f_c' of 10 MPa. The rigid pavement has contacted with the environment during the first 2 hours because of the made of grooving and cutting. The hair-cracks appear at 2 hours of age on 231 segments or 0.1% of all observed segments. Three core drills were done at the rigid pavement with hair-cracks at the age of 8 months. The depth of the cracks reached 77% of the rigid pavement depth. Hair-cracks appear on the surface because CH bond is not strong and elastic enough to withstand the tensile stress on the surface, the change of high rate expansion and high rate shrinkage due to Ca^{2+} .

Keywords: Concrete, cracks, pavement, rigid pavement, humid tropical weather

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