

Forensic analysis of asphaltic pavement failures in Ghana- case histories

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Abstract:

Many newly constructed asphaltic pavements in Ghana have suffered premature failures shortly after opening to traffic. In all cases, available records from the road agencies appeared to show that the roads were constructed in accordance with specification. This paper presents three historical cases of premature failures on two national trunk roads and one inter regional road in Ghana. These case histories give details on pavement history, pavement structure, premature failure types, pavement strength, traffic data, and test results of sampled construction materials used. The results presented showed that severe alligator cracking and rutting were the predominant premature failures on the roads studied. Traffic volume data revealed that the roads which had experience only 5% and 20% of their design life had already exceeded their design traffic values by 30% and 64% respectively. Test results on the road foundation materials (ie, subgrade, subbase and base) showed high proportion of fines (materials passing 0.075mm) and Plasticity Index making them ineffective as drainage layers. In addition, test results on the extracted bitumen from road cores showed significant ageing of the bitumen used in the construction of one of the roads studied. It was found that there was generally, low bitumen content in the asphaltic layers of the roads studied, leading to cracking, disintegration and subsequently, potholes. Based on the findings of this study, it is concluded that accurate prediction of traffic loading, good asphalt mix design practices and selection of better materials for the granular layers of the pavement as well as construction quality control are essential to preventing premature failures of asphaltic roads. This would lead to long lasting pavements, avoiding loss of huge investment in road infrastructure in the country.

Keywords—Asphaltic pavement, premature failure, alligator cracking, rutting, penetration grade bitumen