

DEVELOPMENT OF PAVEMENT DETERIORATION MODELS FOR RGA ROAD NETWORK KSA (CASE STUDY)

ABSTRACT Understanding asset deterioration is essential for effective infrastructure management. Accurate prediction of performance deterioration curves forms a fundamental component of any Asset Management System (AMS).

In Roads General Authority (RGA) the pavement condition rating (PCR) is determined using the International Roughness Index (IRI), rut depth, crack percentage, and crack width, and serves as an indicator of pavement performance within the PMS. This study develops regressed deterioration models for the observed defects. Using the predicted defect values, PCR values are also projected to inform decision-making processes in the AMS.

This paper presents the methodology developed to establish the deterioration models for the pavement network. The deterioration models in this study are constructed using historical survey records from pavement links throughout the network, including Laser Crack Measurement System (LCMS) data, Falling Weight Deflectometer (FWD) data, Ground Penetrating Radar (GPR) data, traffic information, and climate records. The models estimate distress based on climatic factors, pavement thickness, foundation stiffness, and equivalent single axle load (ESAL) traffic. For climatic factors, the annual average high temperature duration (AAHTD) was included in the model analysis to represent the effects of climate on the road network. The predicted models were grouped according to road classification and climate zone to improve model performance.

For each distress within each group, four equations were evaluated (linear, powered, sigmoid and powered), and the equation with the best fit was chosen. The models were validated through comparing the predicted results with measurements in terms of distresses and PCR and showed a high degree of correlation.