

Developing Artificial Neural Networks based Pavement Structural Analysis Tool to Estimate Iowa Local Roads Structural Capacities

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The State of Iowa has approximately 114,500 miles of public roads including state primary highways, county roads, city streets, and others. Among these public roads, many of Iowa county pavement systems have multi-layer pavement structures having multiple cycle of pavement construction and renewal history. Such complex pavement structures make Iowa county engineers having difficulty to estimate the current structural capacities of their in-service pavements for developing cost effective decision-making strategies under managing, maintaining and rehabilitating county pavement systems. The primary objective of this research is to develop an easy-to-use pavement structural analysis tool for use by county engineers in routine pavement analysis, design, asset management practices to provide effective communication regarding pavement needs both to the public and to elected officials. In this study, based on the equivalent layer theory (ELT), multilayer pavement structure is simplified into one layer with an equivalent thickness. Artificial Neural Network (ANN)-based pavement structural analysis models have been developed to find an equivalent thickness and Elastic Modulus of the modeled pavement system. The synthetic databases, which have been used as inputs in ANN forward and backcalculation models, are created by using a Layered Elastic Analysis (LEA) program, MnLayer.

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