

Development of a Simplified Pavement Performance -Based Methodology to Estimate Contractor Pay Factor

By

Ahmed M. Abdelfattah¹, Sameh A. Galal², and Essam A. Sharaf³

Abstract

A highway construction acceptance procedure must be designed to encourage the control of materials and construction (M&C) variables that reflect long-term performance. Therefore, many highway agencies moved away from the traditional specification methods (Method-type and End-result specifications) to Performance-related Specifications (PRS).

Performance-related specifications take into account the long-term performance and Life Cycle Cost (LCC) of the pavement and relate them to the M&C variables. Reward or punishment applied on the contractor is based on comparing the LCC of the as-constructed to the as-designed pavements. To best meet these objectives, the procedure of pavement evaluation follows many statistical algorithms related to pavement performance and economy. These algorithms are executed in a general framework, which contains many steps to calculate the percentage of the payment to bid price (pay factor). The first step in the framework of this study is input data used in estimating the response of both the asphalt mixture (resilient modulus) and the pavement (tensile and compressive strains). Failure of the pavement is indicated by the number of repetitions to failure due to rutting, roughness or fatigue cracking which are considered in this study as pavement performance indicators. The next step is the acceptance plan, which includes cost analysis and pavement economy to determine the contractor payment. Finally, the pay factor is calculated by relating the payment to the bid price.

Due to the importance of PRS and the concern of most highway engineers with this type, many previous computer programs were developed to sustain this type of specification. Unfortunately, these programs were developed under a rather rigid framework limited to specific conditions. The main objective of this study is to develop a new program to provide a much more flexible framework that suits various pavement conditions. Several user-friendly models are utilized in each step to calculate the pay factor. The most important variables that influence the pay factor are deduced from the sensitivity analysis performed on M&C variables
