CENTER FOR TRANSPORTATION RESEARCH

PROJECT SUMMARY

Texas Department of Transportation

0-6967: Evaluate the Use of Percent within Limits as Payment Adjustment Factor for Placement of Asphalt Mixes

Background

The payment for production and placement of asphalt mixes typically requires that the contractor meet requirements for several metrics, including gradation, binder content, laboratory-molded density, segregation, longitudinal joint density, thermal profile, and in-place air voids. Of these, payment adjustment factors are computed to adjust the payment awarded to the contractor based on test results for laboratory-molded density (production) and in-place air voids (placement or construction). The payment adjustment factors can increase the contractor payment by as much as 5%, 7.5%, and 10% as a bonus for the specification Items 341, 344, and 346, respectively or decrease by 28% for Item 341 and 30% for Items 344 and 346 as a penalty. A characteristic feature of the current payment adjustment factors is that these factors are based on average values of the absolute deviation from the laboratory-molded density or the average value of in-place air voids. In some cases, this practice results in a scenario where the contractors deliver inconsistent quality but still receive a bonus because of the average performance. The goal of this project was to evaluate the use of a payment adjustment factor that is not based solely on the average test results for production and placement but is instead based on a measure of quality that reflects both the average and the variability in production and placement.

What the Researchers Did

As a part of this study, several different quality measures were reviewed. A review of the existing literature and practice in other states and recommended practice by the Federal Highway Administration revealed that the gaps identified above can be overcome using a quality measure that is referred to as the Percent Within Limits (PWL). Data from TxDOT's SiteManager database were collected for 2004 and 2014 specification years for Items 341, 344, and 346. Data sets from 2014 specification years, approximately covering the last five years of construction, were analyzed to determine the variability in production and placement metrics and highlight the current gap in payment adjustment factor, i.e., the possibility of awarding a bonus to a contractor based on the average test results even when the variability is high. These data were also then used with hypothetical PWL based payment adjustment factor schemes to demonstrate (i) the feasibility and financial impact of using the PWL based approach for bonuses and penalties, and (ii) the step-by-step process of using this approach for future implementation.

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What They Found

As a part of this study, several different quality measures were reviewed. A review of the existing literature and practice in other states and recommended practice by the Federal Highway Administration revealed that the gaps identified above can be overcome using a quality measure that is referred to as the Percent Within Limits (PWL). Data from TxDOT's SiteManager database were collected for 2004 and 2014 specification years for Items 341, 344, and 346. Data sets from 2014 specification years, approximately covering the last five years of construction, were analyzed to determine the variability in production and placement metrics and highlight the current gap in payment adjustment factor, i.e., the possibility of awarding a bonus to a contractor based on the average test results even when the variability is high. These data were also then used with hypothetical PWL based payment adjustment factor schemes to demonstrate (i) the feasibility and financial impact of using the PWL based approach for bonuses and penalties, and (ii) the step-by-step process of using this approach for future implementation.

What This Means

This study makes the following recommendations: (i) implement the use of a pay factor adjustment table for Items 341, 344, and 346 that is based on the PWL, (ii) review the current practices for randomly sampling and measuring in-place air voids to make adjustments that facilitate the implementation of the PWL method, and (iii) review the current practices for prescribing lot and sublot sizes to make adjustments that facilitate the implementation of the PWL method.

For More Information

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