CENTER FOR TRANSPORTATION RESEARCH

PROJECT SUMMARY

Texas Department of Transportation

0-6853: Improvements to Ride Specification

Background

For more than a decade, the Texas Department of Transportation (TxDOT) has been successfully implementing a ride specification containing an incentive/disincentive schedule. The TxDOT specification is broadly divided into two components: i) equipment selection for road profile data collection, and ii) measurement and pay adjustment. The TxDOT standard specifies two types of ride quality measuring equipment: i) Surface Test Type A, which involves a 10-ft. straightedge, and ii) Surface Test Type B, which involves a high-speed or lightweight inertial profiler that requires annual certification. The ride specification, Item 585, specifies that Surface Test Type A shall be used for ride quality measurements on ramps, service roads, leave-out sections, bridge structures, and short projects (less than 2,500 ft.). The variation between any two contact points on a 10-ft straightedge shall not exceed 1/8 inch in order to comply with the ride specification. The ride quality on other travel lanes and longer projects shall be measured using inertial profilers or Surface Test Type B. Surface Test Type B involves calculation of International Roughness Index (IRI) using TxDOT's Ride Quality software program.

The objectives of this project were to i) develop a rational and financially justifiable pay adjustment system that incorporates the ride quality before and after the construction of the project rehabilitation, and ii) evaluate the existing techniques to measure ride quality using Surface Test Type B or inertial profilers on short projects.

What the Researchers Did

To address the technical objectives of the project, the researchers conducted an extensive review of ride specifications in other states, focusing on ride measuring devices and ride statistics, and payment adjustment systems. A survey of past studies focused on the relationship between pre- and post-construction roughness and pavement performance, and evaluated the need for incorporating the improvement in ride quality into the pay adjustment system. A comprehensive database was developed, integrating SiteManager, Design and Construction Information System (DCIS), and Pavement Management Information System (PMIS) databases. Statistical analyses were performed to establish a pay adjustment scheme based on extended pavement performance due to the ride improvement relative to ride quality prior to the project rehabilitation. As a result, a performance-based pay adjustment system was proposed that incentivizes (or penalizes) pavement projects according to the combination of change in the ride quality and post-construction ride quality.

In terms of roughness measurement on short projects, the research team administered a survey questionnaire with specific and direct questions and in-person interviews designed to obtain insight into the practical issues associated with operating inertial profilers on short projects.

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A field experiment was also carried out to investigate the feasibility of using inertial profilers to measure roughness on short projects.

What They Found

As a result, an interim performance-based pay adjustment schedule was proposed that incentivizes (or penalizes) pavement projects according to the combination of change in the ride quality and post-construction ride quality. The new proposed pay adjustment schedule calculates the total pay adjustment factor based on two parameters: drop in IRI valued between before and after rehabilitation and the IRI value of the newly rehabilitated pavement. This new proposed specification will ultimately result in longer lasting pavements and, consequently, in significant savings to the state in terms of annual maintenance and rehabilitation costs. It will also provide a more logical and pay adjustment schedule as not only the final quality but also the level of quality improvement will be rewarded.

The results of the field experiment and the survey revealed that an inertial profiler operated by an experienced driver could be used to measure the roughness on short projects, provided that sufficient data is collected for stabilization and initialization of the algorithms before that target section. The use of the 10-ft. straightedge should be reserved only for those cases where practical or economic considerations render the use of the inertial profile inefficient. For projects between 528 and 2,500 ft., no special considerations are necessary. For projects between 200 and 528 ft. the average IRI value will be unbiased but more variable. Finally, for projects shorter than 200 ft., the average IRI value will be biased; therefore, an alternative method is recommended.

What This Means

The current pay adjustment factor based on ride quality has served TxDOT well for more than 10 years, resulting in improved pavement quality and more consistent and homogenous projects. The new proposed pay adjustment schedule will reward the quality of the final project but will also reward the improvement in quality in terms of the improvement on ride quality. In addition, the new schedule is performance-based; therefore, it will result in longer lasting pavements and significant savings to the taxpayer and the state economy.

For More Information

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