

0-6705: Evaluating the Effectiveness of Performance Based Pavement Marking Maintenance Contracts in Texas

Background

Pavement markings play a vital role in the safe and efficient movement of traffic on the Texas Department of Transportation's (TxDOT's) roadways. Performance-based pavement marking maintenance contracts (PBPMCs) are one of the latest mechanisms used to maintain adequate pavement marking performance levels. TxDOT has issued two PBPMCs, but the effectiveness of these contracts as compared to other contracting mechanisms from a risk management, cost, performance, or safety perspective has not been evaluated.

What the Researchers Did

This project gathered information to evaluate the effectiveness of PBPMCs by evaluating the delivered pavement marking performance, safety performance, potential cost savings, and most suitable performance measures and measurement protocols for inclusion in future PBPMCs.

The research team conducted a literature review and survey of the districts in Texas to gather information on the current state of the practice. A before-after study with a comparison group defined as crashes that occurred during daytime conditions was used to evaluate the safety performance of the contracts. The retroreflectivity performance of the markings was measured in each PBPMC district as well as a non-PBPMC district for comparison purposes. In total over 1600 miles of pavement marking retroreflectivity data were collected. Two data collection trips were scheduled to

allow the research team to measure newly applied markings in year one, and to evaluate their retroreflectivity degradation by measuring the same marking sections in year two. The cost-effectiveness of performance-based pavement marking and marker contracts was compared to that of the traditional unit-based method of procurement. The data set available for the analysis included installation report quantities, reimbursement reports, and marking and marker condition assessment from 2006 to 2011 for the San Antonio District. The costs associated with the PBPMCs were compared to the costs had the work been conducted using a standard marking contract.

What They Found

The results of the before-after analysis conducted to evaluate the effect of PBPMCs on traffic safety provide inconclusive evidence that performance-based pavement marking maintenance contracts are an effective safety countermeasure that aids in reducing crashes. The before-after analysis showed that the PBPMCs decrease crashes by an estimated

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0.1 percent on average, and the result is not significant at the 95 percent confidence level. Overall, the safety study indicated that PBPMCs have no negative impacts on traffic safety and could potentially improve safety under certain conditions.

The retroreflectivity performance evaluation found that there are statistically significant differences in retroreflectivity levels of new markings among districts, but there are no observable patterns in either white or yellow lines between PBPMC and non-PBPMC districts. The analysis results indicated that there are differences in retroreflectivity decay among districts for yellow lines but not for white lines. The differences, however, may not be directly attributed to the practice of PBPMCs because the results were not consistent between contracting types.

The cost analysis of the PBPMC indicated that neither contract provided financing to the districts. Overall, the value for money of the PBPMC was about even. At best, the value of the work provided by the contractor matches the cost of doing the work using traditional perspective contracting, and the condition of the system was not greatly improved based on the TxDOT-conducted performance assessments. From a cost and performance standpoint, this particular contract did not provide the key benefits of performance-based contracting.

The research report documents numerous recommendations that cover revising the performance measures, measurement protocols, and special specification for performance-based pavement marking maintenance. These recommendations are provided to improve future PBPMCs while making TxDOT aware of the possible consequences (typically higher costs) that may occur if implemented. TxDOT needs to establish the goals of the PBPMC in order to determine the best performance measures, measurement protocols, and consequences that the contractor will face if the PBPMC goals are not met.

What This Means

The PBPMC is a contracting mechanism that may serve a purpose for any district. Based on the research, it is likely to have the best results in a larger district that has access to local, competent contractors and has markings and markers that are difficult to maintain with standard contracts. Limiting the contract to specific roadways or counties is a means to control costs while addressing the markings and markers of highest concern. As with most types of contracts, a contract larger in scope or length will typically provide a better value to TxDOT than a small, short contract.

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