



# Project Summary

Texas Department of Transportation

## 0-6387: Performance Based Roadside Maintenance Specifications

### *Background*

Performance-based maintenance contracts (PBMCs) are increasingly being used for roadway maintenance as an alternative to method-based specifications. With PBMCs, the agency (i.e., owner) specifies measurable performance standards, targets, and timeliness requirements that the maintenance contractor is required to meet throughout the contract period.

There is general agreement in the literature that the key to the success of PBMCs is clearly defined performance requirements, a sound condition assessment method for evaluating compliance with these requirements, a rational performance-based pay adjustment system, and a best-value bid evaluation method. However, PBMCs are still relatively new, and these issues have not been adequately addressed in the literature. The research documented in this report addresses these issues to prepare for potential use of performance-based specifications and contracts in roadside maintenance at the Texas Department of Transportation (TxDOT).

### *What the Researchers Did*

Researchers developed performance-based evaluation methods and specifications for roadside maintenance based on the roadway level of service (LOS) concept. Specifically:

- The research team identified roadside assets and maintenance activities that are most applicable to PBMCs and developed performance standards and timeliness requirements for these assets and activities.
- A condition assessment method for evaluating the contractor's compliance with the performance requirements was developed.
- A methodology for developing optimum pay adjustment formulas was developed. This methodology is designed to motivate the maintenance contractor to perform at the desired performance target through both incentives and disincentives.
- The research team tested and refined the performance standards, condition assessment method, and optimum pay adjustment formulas using field trials and on-site interviews of maintenance personnel at the Dallas and Waco Districts. The field trials consisted of five 10-mi roadway segments located in TxDOT's Dallas, El Paso, San Antonio, Tyler, and Waco Districts.
- The research team identified and evaluated current practices in best-value bid evaluation methods for procuring PBMCs using five case studies from Florida, Virginia, North Carolina, United Kingdom, and New Zealand.

### *Research Performed by:*

Texas Transportation Institute (TTI),  
The Texas A&M University System

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**Project Completed:** 8-31-10

## What They Found

Researchers determined the following results:

- Due to the specificity of the performance standards and the large number of performance standards to be evaluated (55 performance standards), a close inspection is needed to assess compliance with these standards accurately. Thus, random sampling of relatively short sample units (0.1-mi long) is necessary for the condition survey to be practical.
- The appropriate sample size is determined statistically as a function of tolerable error, desired confidence level, total number of sample units in the project, and an estimate of the population's standard deviation.
- The Analysis of Variance (ANOVA) with a multiple population approach showed that the developed condition assessment method is reproducible.
- The sample unit scores (SUSs) were found to follow a *Beta* probability distribution (i.e., SUS values are shifted to the right side of the SUS scale).
- Best-value bid evaluation methods that use the adjusted price concept (i.e., North Carolina and New Zealand case studies) appear to be neutral to price and technical marks. Best-value bid evaluation methods that consider the maximum technical quality offered by the bidders (i.e., the United Kingdom method) appear to favor bids with high technical marks over bids with low price. Best-value bid evaluation methods that use direct price and technical weights (i.e., Florida and Virginia case studies) appear to favor low bids.

## What This Means

A kit of formal performance-based evaluation methods and specifications for roadside maintenance was developed for potential use by TxDOT. This kit includes a set of performance standards and timeliness requirements, a statistical condition assessment method for evaluating compliance with these performance standards, and a method for developing performance-based pay adjustment formulas.

The research results indicate that the best-value bid evaluation method is preferable over the conventional low-bid method for PBMCs. The research team recommends applying the developed performance standards, condition assessment method, and pay adjustment formulas to a pilot PBMC project.

### *For More Information:*

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