



U.S. Department of Transportation
Federal Highway Administration

Performance-Related Specifications: Next Step in Pavement Quality

The need to construct smooth, long-lasting pavements that maximize highway investments and satisfy highway users is leading to improved ways of evaluating highway construction products. Transportation agencies are moving beyond quality assurance specifications that specify end product quality to performance-related specifications (PRS) that specify quality in terms of desired performance over the long term. PRS is helping highway agencies build better, longer-lasting roads and build them more cost-effectively.

PRS models offer a way to predict future performance, maintenance requirements, and life-cycle costs. Construction quality characteristics, such as



initial smoothness, slab thickness, air voids in asphaltic pavements, and strength of concrete cores, have been found to correlate with fundamental engineering properties that can predict performance. PRS describes the desired levels of these key quality characteristics and uses mathematical models to predict

pavement performance. Because they are based on data, PRS models present a clear and realistic picture of what influences a constructed product's performance.

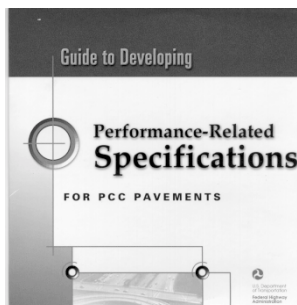
BENEFITS OF PERFORMANCE-RELATED SPECIFICATIONS

There are two types of PRS models: performance-prediction models and maintenance-cost models. Performance-prediction models predict when and to what extent pavement will experience distress such as fatigue cracking or joint spalling. Maintenance-cost models estimate a post-construction life-cycle cost, that is, the cost of maintenance and rehabilitation that will be necessary for the projected life of the pavement. These capabilities make PRS an important tool in pavement management. The shared use of PRS models and technical information among an agency's construction, design, and maintenance units will help to minimize life-cycle costs. PRS can be used to—

- identify a direct relationship between key quality characteristics and product performance.
- identify and specify an optimum level of quality that represents the best balance of costs and performance.
- allow for more incentive for contractor innovations and provide a rational basis for adjusting contractor pay when quality is above or below desired levels.
- provide a critical link between construction and engineering management systems.

IMPROVED
CONSTRUCTION
AND
MAINTENANCE
TECHNOLOGIES
performance of highway systems
new strategies to enhance the quality





Online transition aids

PRS development guidelines and PaveSpec 3.0 software are available for downloading at www.fhrc.gov/pavement/pccp/pavespec.

TRANSITIONING TO PRS

In States that already use QA specifications, familiarity with statistical concepts and procedures will smooth the transition to PRS. Other States can adopt a simplified version of PRS that focuses on establishing life-cycle costs while permitting the agency's standard testing. A second, more sophisticated and more advantageous level of PRS can be added later that employs "in situ" testing and permits project-specific price adjustments.

The second level not only measures quality, but also addresses the issue of how to reward quality work, since test results are mathematically linked to price adjustments. New Jersey is one State that has used this approach successfully. The New Jersey Department of Transportation developed an operational PRS and used it in two projects consisting of 10,000 cubic yards of pavement and structural concrete. The State believes it received more than comparable value in terms of the extended service life of the pavements and structures, and the contractors were pleased with the bonuses and recognition they received for running such well-controlled projects.

PRS GUIDELINES AND SOFTWARE

Another transition aid in moving to PRS is PaveSpec 3.0. The PaveSpec software allows engineers to develop performance-related specifications and to predict the performance of a constructed pavement. Highway agencies and contractors can use the software to get a better understanding of what it takes to construct highways for better performance. PaveSpec simulates pavement performance (e.g., distress, smoothness), applies a user-defined maintenance and rehabilitation plan, computes life-cycle costs and contractor pay, and conducts sensitivity analyses on given specifications.

PaveSpec 3.0 and the CD-ROM "Guide to Developing Performance-Related Specifications for PCC Pavements" are available at www.fhrc.gov/pavement/pccp/pavespec. For more information, contact Peter Kopac at 202-493-3151 or peter.kopac@fhwa.dot.gov.

NATIONAL STRATEGY FOR DEVELOPING PERFORMANCE-RELATED SPECIFICATIONS

The Federal Highway Administration (FHWA) has organized an internal PRS team to establish and execute a comprehensive, coordinated FHWA-wide program for advancing the understanding and use of PRS within the highway industry. The team developed an implementation approach and held a national workshop to begin work on a National PRS Action Plan.

A major focus of implementation is the organization of a PRS Technical Working Group and subject-area Expert Task Groups. The 18-member Technical Working Group will include representation from the States, industry, academia, and FHWA, and will provide guidance to the Expert Task Groups, which will assist in the actual formation and validation of PRS products.

The FHWA team has developed a framework and a PRS specification matrix concept. This was used in a long-range National PRS Action Plan, which was completed in August 2001.

For more information on FHWA resources, contact your local FHWA division office or:
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