



U.S. Department of Transportation  
Federal Highway Administration

# PRODUCT BRIEF

## Rigid Pavement Design Software: A New Tool for Improved Rigid Pavement Design

### Introduction

Improved guidelines for designing portland cement concrete pavements were developed under National Cooperative Highway Research Program (NCHRP) research and were validated by Long Term Pavement Performance (LTPP) data. Subsequently, these procedures were adopted by the American Association of State Highway and Transportation Officials (AASHTO) and published in the *1998 Supplement to the AASHTO Guide for Design of Pavement Structures, Part II — Rigid Pavement Design & Rigid Pavement Joint Design*. Design improvements incorporated in the supplement include improved subgrade k-value selection criteria, consideration of curling and warping, joint spacing design, consideration of slab/base friction, and faulting and corner break prediction.

To help highway managers and engineers implement this improved design procedure, LTPP developed a software program called Rigid Pavement Design Software. The software allows the engineer to tailor the rigid pavement design to the site-specific conditions, materials, traffic, and design details. The resulting design is more cost-effective and reliable.

The new software is intended to be used in concert with DARwin (the computerized version of the AASHTO '93 Guide) as an interim tool.

### What Is Rigid Pavement Design Software?

Rigid Pavement Design Software is a Microsoft Excel spreadsheet that automates the design and analysis procedures in the 1998 AASHTO supplement. The spreadsheet includes separate tables for determining accumulated traffic loadings, seasonally adjusted k-values, depth to rigid layer, and performing corner break and faulting checks.

### Who Can Benefit From Rigid Pavement Design Software?

The principal stakeholders in and contributors to the LTPP project — the State and provincial highway agencies — will benefit most directly and immediately from the Rigid Pavement Design Software. The improved design guidelines will help answer key questions not previously addressed in design procedures, such as:

- How do I adequately characterize the subgrade support?
- What is the best base type for the conditions?
- What is the optimum joint spacing?
- Will this pavement fault or have corner breaks?

### Rigid Pavement Design Software Features

The Rigid Pavement Design Software features four new or modified design inputs that are not available in DARwin. These include:

- Subgrade support.
- Joint spacing.
- Slab/subbase friction.
- Temperature differential throughout slab.

The subgrade support input is characterized by the effective (seasonally adjusted) elastic k-value of the subgrade, rather than the “composite” k-value of the subgrade/base system.

After starting the program, the user inputs concrete properties, base properties, reliability and standard deviation, climatic properties, subgrade k-value, design equivalent single-axle loads (ESALs), pavement type, joint spacing, and edge support via the input screen. This screen serves as the program's "home base" from which tables are referenced and computations are made.

In some cases, the designer must make an educated guess as to the final design thickness. Should this estimate vary significantly from the design output, a revised

estimate is used and the design is re-computed.

The new Rigid Pavement Design Software also features a Sensitivity Analysis capability. This feature allows the user to do "What happens if ..." scenarios to determine, for example, the best base material for a fixed joint spacing, or the optimum joint spacing for a fixed base type. Design parameters that can be analyzed using the Sensitivity Analysis feature include modulus of rupture, elastic modulus of slab or base, base thickness, k-value, joint spacing, reliability, and standard deviation.

### Rigid Pavement Design Software System Requirements

Rigid Design Pavement Software can be used on any IBM PC running Microsoft Office 95 or 97 or Microsoft Excel 7.0.

### For More Information

The Rigid Pavement Design Software can be downloaded from FHWA's LTPP website (<http://www.tfhr.gov>).

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