R&T UPDATE
Concrete Pavement Research & Technology

LONG TERM PAVEMENT PERFORMANCE STUDY

SHOWS THE EFFECTS OF DESIGN FEATURES ON JOINT FAULTING

A recently released report from the Federal Highway Administration summarizes the effects of various concrete pavement design features on faulting. Faulting, the differential vertical displacement of slabs along transverse joints, can be a major distress in heavily-trafficked plain concrete pavements unless suitable design features are included to prevent it.

The report titled "Preliminary Evaluation and Analysis of LTPP Faulting Data, Final Report," primarily addresses the completeness and quality of faulting data contained in the Long-Term Pavement Performance (LTPP) database. A limited study of the factors affecting joint faulting is also included.

Based on LTPP data, the study offers the following observations:

For doweled pavement:

- Use of load transfer devices has the greatest effect on the amount of joint faulting. Use of dowel bars reduces joint faulting of JPCP sections by a factor of two.
- Doweled joints exhibit very little faulting even after many years of service.
- The effect of design features such as drainage, tied concrete shoulders and joint spacing is not as significant when doweled joints are used.
- Use of larger diameter dowels results in lower faulting values.
- Use of skewed joints did not show a significant difference in faulting values for doweled joints.

For plain concrete pavement without dowels:

- Sections located in a wet-freeze climatic zone exhibited the worst faulting among all sections.
- Use of widened lanes results in significant reduction of edge faulting values.
- Use of drainage features significantly reduces faulting.
- Use of stabilized base/subbase significantly reduces faulting.

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It should be noted that most of the sections in the LTPP database have carried a significant amount of traffic. These observations for undoweled concrete pavements likely would not be applicable for roadways carrying lower volumes of heavy trucks.

Regarding the effects of faulting on smoothness:

> "The effect of faulting on ride quality was investigated using JPCP sections with three or more faulting and IRI surveys conducted no more than 1 year apart from each other. A strong correlation was found between rate of change in faulting values and rate of change in IRI values for JPCP sections. Thus, faulting was found to be a major component of increased roughness of JPCP.

The report also contains a significant conclusion regarding the accuracy of the faulting data (and the resulting conclusions of the data analysis).

> "The faulting quality issue addressed in this study was affected by the precision of the Georgia Faultmeter, which is the standard faulting measurement equipment used in LTPP studies. A review of numerous faulting records indicated that accuracy of ±1mm is inadequate because representative maximum faulting values, obtained as an average of all maximum faulting values for all sections and surveys, were about 5 mm for non-doweled sections and 3 mm for doweled sections."

The report is available from the Federal Highway Administration for no charge as long as the supply lasts. Email your request to ltppinfo@fhwa.dot.gov, contact the FHWA R&T report center (301-577-1421), or contact Mary Anne Deeney (telephone: 202-493-3463 or fax: 202-493-3161).

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