PCC JOINT FAULTING – GEORGIA FAULTMETER

General Description

Portland cement concrete (PCC) pavements are constructed with transverse contraction joints to relieve stresses in the slabs caused by temperature and moisture. Over time, traffic loading and erosion of the soil layers under PCC slabs results in stepping or “faulting” of the transverse joints. Faulted joints have a direct impact on the ride quality of the pavement.

Fault measurements are being taken at the MnROAD project to establish long-term trends that can be used to calibrate models in new mechanistic-empirical design methods.

Equipment

Data collected manually currently and efforts are being focused to automate the faultmeter device.

Measurements are taken using an electronic digital faultmeter. Mn/DOT uses the same model as that developed by the Georgia Department of Transportation. This model is also the standard device used in the data collection for the FHWA LTPP (Long-Term Pavement Performance) project.

MnDOT’s faultmeter was originally constructed to Georgia DOT specifications by MnDOT’s Maplewood Laboratory shop personnel. Modifications to the device were designed by the author and made by the shop in the winter of 2001-2002, to enhance the repeatability of the measurements. The principle change was the replacement of the four point “long feet” system, with a three point “bolt feet” system. Due to surface irregularities in the concrete pavement slabs, the four point long foot system commonly resulted in the operator having to move the device several times to avoid rocking of the base, which often led to non-repeatable measurements. By installing the three point “bolt head” feet, the device could simply be set down for a quick, stable and repeatable measurement. An offset rod was also added to the device, which increases the speed of measurements. The rod can be used as a guide to quickly place the device relative to the outside edge of the fogline painted on the test sections. Allen head anchor screws allow quick and easy adjustment, as well as removal, of the rod.

Data is currently collected manually, although efforts are being made to automate the device.
Data Collection and Processing

Faulting measurements are typically taken 3 times per year. Measurements are taken at selected joints, and the offset from the centerline is recorded. One measurement is made at each location. The representative value of the readings is recorded to the nearest millimeter. Faulting is assumed to be positive.

Fault measurements at the MnROAD project follow the criteria established by the FHWA LTPP project. Measurements were originally taken at each joint, in the direction opposite traffic flow, at offsets of 1 and 2.5 feet from the outside edge of the fogline (see update note below). By examining the faulting trends from 1994-2003 at each of the transverse joints in the test sections, approximately 50 percent of the joints were chosen for monitoring since 2003. Selection criteria were based on a smooth historical trend and whether the slope of a linear best-fit line through the data was typical for each test section. Most joints do not exhibit a linear trend in faulting during their early age; however most follow a linear type trend later in life.

In January 2009, several new MnROAD test sections were added to the fault measurement schedule. The location of the measurement points was also revised. The measurement points were moved to standard offset distances of 3 feet and 10 feet from the centerline of the pavement for both lanes. It was believed that enough measurements had been taken at 1 foot and 2.5 feet from the fogline for comparison and that more interesting trends may be observed by comparing faulting in the two wheelpaths of each lane. Due to centerline tie-bars, many pavements tend to fault more in the wheelpath nearest the shoulder. These new testing locations should provide valuable data toward characterizing this phenomenon.

The table below shows the columns that are in the Data Product table entitled PCC_JOINTFAULTING.

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*Note that table column definitions and units can be found in Section J of the Data Product.*
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