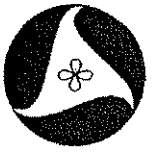
INSTRUMENTATION OF PAVER VIBRATORS

Final Report
For
MLR-95-10

January 1999

Project Development Division



Iowa Department of Transportation

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Final Report
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MLR-95-10

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January 1999

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DISCLAIMER

INTRODUCTION

Premature deterioration of Portland Cement Concrete (PCC) pavements led to investigations for causes of the concrete failures. Evidence of parallel longitudinal cracks in deteriorating pavements, with crack spacings similar to paver vibrator spacings, made it clear that the vibrators were related to the cause for deterioration.

After a number of field trips observing paving operations and measuring vibrator frequencies, it soon became clear that the paver vibrators were, in many cases, not running in compliance with the Iowa DOT specification. The specified frequency was from 5000 to 8000 revolutions per minute (rpm). The pavers visited did not have a monitoring system to give a continuous frequency readout for any of it's vibrators. Occasionally, during a paving operation, frequency readings were taken on some vibrators with a hand held tachometer. However, that degree of monitoring was found to be far from providing the quality of information and control necessary to maintain compliance to the Iowa DOT specification.

A paver vibrator monitoring system, which would operate continuously while paving and cover all vibrators, was determined to be essential. The output must be visible to the paver operator and inspector at all times.

PURPOSE

With the growing understanding of the reasons why noncompliant vibration was often occurring, it became clear that a continuous operating electronic vibrator monitoring system was needed. There was no known system available on the market. Research was required to initiate the development of the needed monitor.

TESTING

This Materials Lab Research (MLR) was proposed in September 1995 to initiate the purchase and testing of basic components which may lead to the development of a vibrator frequency monitor.

An Isotron accelerometer, model ACC101:G1 with accessories, was purchased for preliminary testing as a source for the frequency signal. The purchasing and testing of the equipment was done by the Materials Electronics Laboratory. The accelerometer was coupled with an existing vibrator from the Materials Concrete Laboratory. Test results were not conclusive.

COMMERCIAL SUPPLIERS

While communicating with the two major commercial vibrator suppliers, it was learned that they each had also started working on the development of a frequency monitoring system. From one of them it was learned that they also had inconclusive results from use of accelerometers. It was becoming obvious that the vibrator suppliers were preparing to invest whatever was required to develop an electronic vibrator monitoring system. With that information, this Iowa DOT MLR project was terminated on April 1, 1997.

IMPLEMENTATION

The findings from this research provided ideas and stimulation to the major suppliers of vibrators for their research and commercial development of automated electronic vibrator monitoring systems. Commercial prototype models were field tested under research project HR-1068, during the 1997 construction season.