Preliminary investigation on establishing a new resilient modulus test approach for reduced size asphalt mixture samples smaller than 100 mm diameter

ABSTRACT

The performance evaluation of existing flexible pavements has become a priority issue for many highway maintenances engineers. To make appropriate rehabilitation and management decisions, the engineers most often rely on efficient methods for the determination of the strength of pavement layers. Resilient modulus is a very important parameter to be identified and used in pavement design. The resilient moduli of asphalt mixtures are typically measured using the indirect tension test procedure in compliance with the ASTM D4123 standard that is superseded by ASTM D7369. The standard requirement is that the prepared specimens for the tests should have a minimum height of the sample over its diameter ratio of 0.4. Generally, specimens used in the tests are either a nominal 100 mm or 150 mm in diameter with a minimum thickness over diameter ratio of 0.4. However, 100 mm diameter core specimens taken from site wearing courses with thicknesses ranging from 40 mm to 50 mm most often do not fulfil the minimum ratio of 0.4 after they are trimmed for testing. Since there was no any option, part of the binder courses had to be trimmed to make up for the minimum ratio requirement. This tends to result in inaccurate assessment of the resilient modulus values of the samples. As such, a new procedure was explored to test specimens smaller than 100 mm in diameter. This may minimize the material volume requirement from the field and also for the fabrication of smaller samples in the laboratory. Based on the available thickness of wearing course or overlay, the appropriate sizes were determined. For a two-layer system a 56.3 mm diameter was deemed necessary while a 37.5 mm diameter was observed to be appropriate for a three-layer system. Such an approach for resilient modulus test using miniature specimens of 56.3 mm and 37.5 mm in diameter has a great potential for practical relevance for the industry.

Keyword: Resilient modulus; New procedure; Cost; Time and less destructive