Development of Mix Design Process for Cold In-Place Recycling

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ABSTRACT

Cold in-place recycling using emulsified asphalt (CIR-emulsion) is a recycling process that evolved during the late 1980s. The need for a CIR-emulsion mixture with specific engineering properties calls for the use of a mix design. However, no standard mix design is available for CIR-emulsion in Iowa. Some cold in-place recycling using engineered emulsion (CIR-EE) mix design procedures are complex and require special equipment that is not commonly available. Recently, a new mix design procedure was developed for CIR. As a part of CIR mix design process, the simple performance tests, which include dynamic modulus test, dynamic creep test, and static creep test, were conducted to evaluate the performance of CIR mixtures at various testing temperatures and loading conditions. The optimum emulsified asphalt contents were found near 1.0%. Dynamic modulus, flow number, and flow time of CIR-emulsion mixtures using CSS-1h were generally higher than those of HFMS-2p. Flow number and flow time of CIR-emulsion using recycled asphalt pavement (RAP) materials with softer residual asphalt was higher than those of CIR-emulsion using RAP materials with harder residual asphalt. The dynamic modulus, flow number, and flow time values were affected by both emulsion types and residual asphalt stiffness of RAP materials.

Key words: cold in-place recycling—dynamic modulus—emulsified asphalt—flow number—flow time