Contiguous aggregate packing as common principle for benchmarking asphalt density, stiffness and permeability control

Horak, E; Komba, Julius J; Maina, J; Sebaaly, H and Muller, J

Abstract
Contiguous aggregates are aggregate sizes that consecutively follow a typical aggregate grading curve. Porosity calculation is possible for a binary or longer ranges of contiguous aggregates. Porosity is a fundamental density indicator and can indirectly be an indicator of permeability potential. The traditional Bailey method follows the principle of the ratio of void size to aggregate or simulated sphere diameter that ensures optimal aggregate packing of the aggregate skeleton. In this paper, the Bailey method description of the grading curve and defined control sieves were used as a reference, allowing the description of various Rational Bailey Ratios adhering to contiguous aggregate fractions in these ratios. Thus, porosity calculations can be done for the contiguous aggregate fractions in these defined Rational Bailey Ratios on the normal aggregate grading curve. Recent research work on asphalt mix design compaction, air void distribution, stiffness, rut resistance, correlation with permeability predictors, and density indicate Rational Bailey Ratios can be used for the optimization of HMA mix designs via benchmarking. This approach is described as the Contiguous Aggregate Packing benchmark methodology.