

ABSTRACT

One of the most serious impediments to the continued successful use of hot mix asphalt (HMA) pavements is rutting. The Iowa Department of Transportation has required 85% crushed particles and 75 blow Marshall mix design in an effort to prevent rutting on interstate roadways. The objective of this research and report is to develop relationships between the percent of crushed particles and resistance to rutting in pavement through the use of various laboratory test procedures.

HMA mixtures were made with 0, 30, 60, 85 and 100% crushed gravel, crushed limestone and crushed quartzite combined with uncrushed sand and gravel. These aggregate combinations were used with 4, 5 and 6% asphalt cement (ac).

Laboratory testing included Marshall stability, resilient modulus, indirect tensile and creep. A creep resistance factor (CRF) was developed to provide a single numeric value for creep test results. The CRF values relate well to the amount of crushed particles and the perceived resistance to rutting. The indirect tensile test is highly dependent on the ac with a small effect from the percent of crushed particles. The Marshall stability from 75 blow compaction relates well to the percent of crushed particles. The resilient modulus in some cases is highly affected by grade of ac.