

Investigation of the use of waste crushed glass in the production of asphalt mixes

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ABSTRACT:

Recent study at the Council for Scientific and Industrial Research in South Africa has revealed the potential to substitute depleting natural aggregates with waste crushed glass in asphalt mixes. This paper presents an investigation of the use of crushed glass as an aggregate replacement in a conventional dense-graded asphalt wearing course commonly used on highways in South Africa. The objective of this study was to design a dense-graded hot-mix asphalt that utilises 15% of waste crushed glass as a substitute material for sand, and to compare its performance with a conventional dense-graded mix. The mix design was based on current South African methods. The overall results indicate that the glass asphalt mix meets the South African criteria, thus the mix design is acceptable. The optimum binder content of the glass asphalt mix was 5.1%, compared with 5.0% for the conventional dense-graded asphalt mix. Further investigation of the stiffness and rutting performance characteristics indicated that the asphalt mix with crushed glass could outperform the conventional asphalt mix in terms of resistance to rutting. The measured performance data were used to develop semi-empirical dynamic modulus and permanent deformation models for the two asphalt mixes.