

**Effective utilization of rap materials for rehabilitation of flexible pavements a case study of  
Mandela Road, Dar es salaam**

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The use of recycled asphalt pavement (RAP) materials has proven to be advantageous in terms of reduced construction cost, conservation of materials, preservation of existing road geometry and the environment. However, these advantages have generally not been fully exploited in Tanzania, as it has mostly been applied for construction of sub-bases only. This study therefore investigated the suitability of recycled pavement materials for construction of base course and surfacing, in addition to the sub-base course. Characterization tests, strength tests and Marshall design parameter tests were performed on RAP mixtures under laboratory conditions. Effect of RAP materials, virgin binder and cement on design parameters for the bases and surface courses of a heavy traffic pavement were investigated. For the base course, limestone aggregates were mixed with RAP materials at 0%, 30%, 40%, 50%, 60% and 100% RAP content by weight. To each of these mixtures, 1%, 2% and 3% cement content was added to produce cement stabilized RAP mixtures. For the surfacing layer, RAP materials at 10%, 20%, 30%, 40% and 50% RAP content.

Results indicate that the cement stabilization increases strength of RAP materials. The UCS increases from 1.0 MPa for RAP to 2.9 MPa for blended materials with 60% RAP and 3% cement. CBR increases from 36% for RAP to 75% for blended materials with 50% RAP and 0% cement. The findings also revealed that stability of Marshall specimens increases with increasing RAP content and optimum binder content and VMA decrease with increasing RAP content.

Addition of up to 15% old bitumen (by weight of total binder) to the virgin binder satisfies the requirements of the virgin 60/70 pen-grade bitumen specifications, except for viscosity. In order to achieve the specified viscosity, therefore, it is recommended that softer virgin bitumen (in this case, pen-grade 80/100) be used when the binder is to be produced by blending virgin bitumen with old recovered bitumen from RAP materials.