

Rigid Pavement Design with Recycled Concrete Aggregate for Low Volume Roads

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The main consideration of any pavement design is to provide structural alternatives that are feasible both technically and economically. This can be achieved by specifying pavement layer thickness with proper types of materials based on the extent traffic, environmental conditions and life cycle cost analysis.

Since traffic is regarded as the key design parameter, traffic analysis was done for seventeen provincial roads. That analysis was carried out to find vehicle composition, magnitude of the axle loads, axle configuration and frequency of load repetitions. In rigid pavement construction main component is concrete slab. Proper types of material should be selected for the concrete slab. In this project, it was determined the strength characteristic of recycled aggregates that can be used as an alternative material for rigid pavement construction instead of natural aggregate in concrete.

An experimental campaign was implemented in order to monitor the recycled aggregate properties before utilizing them as a rigid pavement construction material. Properties of recycled aggregate were determined in terms of (i) particle size distribution (ii) particle density (iii) porosity and absorption (IV) particle shape (v) strength and toughness.

In this study, various physical and mechanical properties of concretes were examined. The concrete properties were determined by doing the workability test, compressive test, flexural strength and modulus of elasticity test. Platizing admixture was added to recycled aggregate concrete with the aim of improving its properties.

Suitable dimensions were proposed for provincial roads based on the traffic volume and the recycled aggregate concrete properties. Fatigue analysis (to control fatigue cracking) and erosion analysis (to control foundation and shoulder erosion, pumping and faulting) are the two design criteria in rigid pavement design. Fatigue analysis will usually control the design of light – traffic pavements while erosion analysis controls the design of medium-and heavy traffic pavement. Therefore erosion analysis was not considered to propose a pavement thickness for provincial roads. Fatigue analysis was regarded as the main parameter to propose a suitable thickness for rigid pavement in provincial roads