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The potential of using recycled bricks as a material in sub base applications

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A significant proportion of waste materials in landfills is construction and demolition (C & D) waste material. Recycled bricks are a type of C & D waste that can be considered as a viable substitute for natural construction materials in engineering applications such as in road sub-base construction. Recycled bricks can also be a suitable alternative material in pavement applications. Typically, quarried materials are used in pavements base/sub-base layers and, at present, such materials are obtained mainly from gravel excavations. However, such resources are depleting rapidly due to increasing demand for high quality pavement materials and, as a result, replacement of traditional gravel materials with alternative materials is increasingly preferred from both environmental and economic perspectives. An investigation was thus conducted to assess the potential of using recycled bricks as a material in sub-base applications.

A series of extensive geotechnical laboratory tests was undertaken on crushed bricks blended with gravel in the varying proportions of 100%, 50%, 30% and 15%. Particle size distribution tests (Sieve analysis) were carried out for all the blends. Atterberg limit tests, Modified Proctor compaction tests and 4-day soaked CBR at 98% MDD (Modified) tests were also carried out. The geotechnical properties obtained by the tests were compared with ICTAD requirements of sub-base specifications for pavement base and sub-base applications. The results revealed that the grading of all the blends tested satisfied the grading requirement for sub-base construction as per ICTAD specifications. The addition of gravel increased the maximum dry density and the CBR value of the blends. The 100% recycled brick sample achieved a maximum dry density of 2020 kg/m^3 and a CBR value of 113% and satisfied the standard requirement. In addition, the blend of 50% crushed bricks and 50% gravel also satisfied the Atterberg limit dry density (1779 kg/m^3) and CBR value (32%) requirements of ICTAD standards. The findings suggest that the two blends of recycled bricks and gravel can be satisfactorily used as a pavement base or sub-base material and the usage of recycled bricks as a substitute material for gravels, either partially or fully, as a sub-base material can be recommended.

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