Abstract

In the current era, the present day world has witnessed a phenomenal rise in construction activities over decades. The demolition of existing old structures inevitably results into the generation of construction and demolition (C&D) waste, the disposal of which is a problem causing environmental hazards. However, the composition of this waste comprises of concrete material, which has a potential to be used as aggregate in making the second generation concrete.

The prime objective of the present work is the effective utilization of this material as recycled aggregate by replacing normal aggregate in defined proportions so that a durable M25 grade concrete is produced. In order to achieve this objective, the characteristics of recycled aggregates procured from ten different places from Western Maharashtra have been studied. It is observed that due to lower specific gravity and higher water absorption of recycled aggregates on account of adhered mortar, the concrete prepared with such recycled aggregates adversely affects compressive strength. Therefore, a simple and most practical method has been proposed in the present work to remove adhered mortar.

Further, the mix proportions of recycled aggregate concrete are required to be selected depending on these typical properties of recycled aggregates. The replacement of 0, 50, 60 and 100 percent of normal aggregates by recycled aggregates have been studied by testing 186 specimens. Substitution of 60% of normal aggregate with recycled aggregate of 20 mm maximum size gives rise to desired compressive strength when mix design methodology as devised in the present work is adopted. Durability of 105 specimens of such recycled aggregate concrete has been examined by conducting typical tests, namely rapid chloride permeability, water permeability, drying shrinkage, modulus of elasticity and creep. The results of these tests inferred that recycled aggregates behave like normal aggregates when processed for removal of adhered mortar and also provide a durable M25 grade concrete, thus vindicating the objective in its entirety.