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Sushovan Dutta, M.B. Nadaf, J.N. Mandal

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Abstract

With rapid growth in population, it becomes difficult to control the huge amount of residual materials generated from enormous industrial activities. The residuals that are not recycled, reclaimed or reused constitute the wastes only to get released to the environment. As some of the wastes cannot be assimilated by the environment, those can become hazardous for the environment quality and ensure pollution. This paper expresses the concern on two such industrial wastes, used plastic water bottles and fly ash. The present study emphasizes on the reuse of used waste plastic water bottles in the Civil Engineering applications and in this regard, it discusses the previous work by Dutta and Mandal (2013). Two different type plastic water bottles, having different diameter and tensile stiffness, were chosen to prepare perforated cells of

different heights wrapped with jute geotextile from inner side so that fine infill materials cannot escape from the perforations. Laboratory strain controlled compression tests were carried out on the cells rested over a rigid base and filled with compacted fly ash or stone aggregates. Test results showed significant load carrying capacity of the composite cells with fly ash as infill material. Though fine fly ash appeared to be an effective infill material, use of coarse stone aggregates as infill material produced better load carrying capacity of the composite cells. It was also observed that with reduction in cell height over the rigid base, load carrying capacity of the composite cells got increased. The study confirmed that plastic bottles with suitable infill material can act as an ideal compression member.

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Keywords

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An Overview on the Use of Waste Plastic Bottles and Fly Ash in Civil Engineering Applications

Sushovan Dutta*, M. B. Nadaf, J. N. Mandal

IIT Bombay, Powai, Mumbai, India

Abstract

With rapid growth in population, it becomes difficult to control the huge amount of residual materials generated from enormous industrial activities. The residuals that are not recycled, reclaimed or reused constitute the wastes only to get released to the environment. As some of the wastes cannot be assimilated by the environment, those can become hazardous for the environment quality and ensure pollution. This paper expresses the concern on two such industrial wastes, used plastic water bottles and fly ash. The present study emphasizes on the reuse of used waste plastic water bottles in the Civil Engineering applications and in this regard, it discusses the previous work by Dutta and Mandal (2013). Two different type plastic water bottles, having different diameter and tensile stiffness, were chosen to prepare perforated cells of different heights wrapped with jute geotextile from inner side so that fine infill materials cannot escape from the perforations. Laboratory strain controlled compression tests were carried out on the cells rested over a rigid base and filled with compacted fly ash or stone aggregates. Test results showed significant load carrying capacity of the composite cells with fly ash as infill material. Though fine fly ash appeared to be an effective infill material, use of coarse stone aggregates as infill material produced better load carrying capacity of the composite cells. It was also observed that with reduction in cell height over the rigid base, load carrying capacity of the composite cells got increased. The study confirmed that plastic bottles with suitable infill material can act as an ideal compression member.

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* Corresponding author.
E-mail address: sushovan@iitb.ac.in

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