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Effect of Using Recycled Coarse Aggregate to the Bond Stress in Term of Beam Splice Specimens

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Abstract

In fact, demolition west disposal represents a serious problem in the civil engineering work since such materials are accumulated in large quantities. In this way, using these materials in new construction is considered a good sustainable and cost effective solution. The basic objective of this study is to investigate the behavior of lap splice when recycled coarse aggregate is used in structural members by experimental program. This program comprises casting 12 beam splice specimens. Two mix designs are proposed with nominal compressive strength of 20 and 30 MPa, more precisely, the degrees of coarse recycled aggregate partial replacement ratio that taken throughout this study are 0, 50 and 100% respectively using a crushed concrete casted with the same original mixes defined. Since a considerable lack of information was observed about the role of recycled coarse aggregate when the bond stress is taken into account, the beam splice specimens during this study were devoted to investigate lap splice bond strength in both singly and doubly beams to discover the desired behavior in tension and compression. The results showed that the degree of recycled coarse aggregate decreases the consequent bond stress in term of beam splice specimens for singly and doubly beams. The brittle failure behavior is evident in the entire beam specimens that conducted throughout this study.

Keywords: Recycled Coarse Aggregate; Concrete; Reinforcement; Bond Stress; Beam Splice Specimens.

1. Introduction

Usually, structures like bridges, roadways and buildings are still have a progressive increasing rate in the urban areas. When the old units of such structures reach the end of its service life and/or no longer satisfy their purposes, repairing or replacement processes are dictated which in turn increases the demand for a certain construction materials like concrete and asphalt aggregates. Concrete demolition aggregate or simply recycled aggregate concrete is a very common material that proved a significant role within this field as a cost effective and sustainable agent to substitute normal aggregate because such aggregate is generated in huge quantities every year as a waste material [1].

As a consequence, recycled aggregate concrete was used recently in different ways such as soil stabilization as well as being a recycled aggregate in concrete buildings construction.

More precisely, the main difference that can be recognized between the recycled and normal aggregate is the presence of the mortar reminders around its particles, however, such presence dictates more pores to be evident which means that many chemical and physical properties are dissimilar, due to that, the consequent characteristics and performance of the concrete can vary to a great concern. This variety is extended to the mechanical behavior and durability as well as low

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