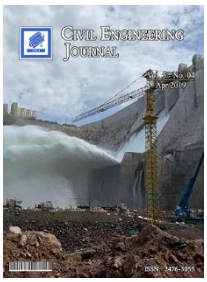
Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 5, No. 4, April, 2019



Effect of Hospital Effluents and Sludge Wastewater on Foundations Produced from Different Types of Concrete

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Received 09 February 2019; Accepted 15 April 2019

Abstract

In last decades, there is an insufficiency of fresh water and construction works are increasing day by day consuming large amount of fresh water. Therefore research is processing on to employ the treated domestic wastewater in the preparation and curing of concrete. In this investigation, the concrete slab specimens casted with normal strength concrete and modified reactive powder concrete. The concrete specimens cast by using fresh water, wastewater, and hospital effluents water. The specimens cured in all water types for 28days and 56 days. At 28days curing with wastewater, a decrease in punching shear strength was observed from 24 kN in case of curing with fresh water to 21 kN and 20 kN in case of curing with wastewater and hospital effluents water respectively. Highest strength is exhibited by 56 days curing age, it was recorded about 32 kN, 24 kN and 23 kN punching shear strength of specimens cured with fresh water, wastewater and hospital effluents water respectively. The excess quantity of bicarbonates in treated domestic wastewater as curing water results a decrease in compressive strength of concrete specimens. Appearance of first crack was also affected significantly by using wastewater and hospital effluents water as curing water; 7.5 kN, 6.5 kN and 6 kN were the first crack loads of normal strength concrete panels cured with fresh water, wastewater and hospital effluents water, and 11 kN, 10 kN and 7.5 kN were the first crack loads of modified reactive powder concrete cured with fresh water, wastewater and hospital effluents water.

Keywords: Slab; Fresh Water; Wastewater; Hospital Effluents Water; Punching Shear Strength; First Crack Load.

1. Introduction

Concrete is one of the most important construction materials in most countries of the world. This material is usually made from mixing the gravel, sand, cement and water. The amount of aggregate is about 70% of normal concrete components, while a cement and water represent 20% and 10% respectively of concrete components. The amount of water used in the concrete industry is about 1 billion tons in the world, in addition to the large amount of water used in concrete curing. Therefore, the concrete industry is an important factor affecting the environment through water consumption. So, it is necessary to find other resources of water to compensate the quantities industry. Impurities in water used for mixing concrete, when excessive, may affect not only the concrete strength but also setting time and may cause efflorescence staining. Therefore, a specific specifications should be adopted to clarify the limits of sulfates, alkalis, chlorides and solids in curing and mixing of concrete, in addition to perform different tests to notify the properties of water [1].

The impact of wastewater on the durability of concrete cannot be omitted. According to ACI committee 201 [2] , the durability of concrete is the ability to resist the chemical attack , weathering condition and abrasion or any other conditions causing concrete deterioration [3]. The durable concrete keep its serviceability and quality when exposed to environmental conditions.

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http://dx.doi.org/10.28991/cej-2019-03091291