



## Mechanical Properties of Concrete Containing River Indus Sand and Recyclable Concrete Aggregate

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### Abstract

In Pakistan construction Industry, concrete construction is cheaper than the other construction methods with respect to that construction materials demand rises. The 75% volume of total concrete fill with aggregate which contributes to decrease the natural aggregate resources day by day. The best solution for this problem is to utilize River Indus sand and recyclable concrete aggregate as fine and coarse aggregate respectively. In this research the River Indus sand and recyclable coarse aggregate were fully replaced with normal aggregates. The aim of this study was to examine the flexural and tensile performance of concrete containing the River Indus sand and recyclable concrete aggregate. The physical properties were also examined which include the sieve analysis and chemical composition of River Indus sand. The M15, M20 and M25 grade were analyzed at 7, 14, 21 and 28 days water curing. The results define that, flexural strength was reduced from 5% to 15% compared to normal aggregate whereas tensile was decreased from 1% to 1.8% at 28 days water curing.

*Keywords:* Flexural Strength; Tensile Strength; River Indus Sand; Recyclable Concrete Aggregate; Sieve Analysis.

### 1. Introduction

Concrete is one of the most utilized building material in construction industry due to its durability, accessibility and economy [1]. Basically, Cement, aggregates and water are the main ingredients of concrete but admixtures are used to get special properties [2-3]. Aggregates are considered as an important ingredient, which occupies 70% to 80% of concrete volume. Fine aggregate is utilized to fill the gaps between the coarse aggregate and made the concrete strong. The composition, shape, and size of the fine aggregate has great influence on the fresh and hardened properties of concrete [4]. Whereas coarse aggregate possessed the almost 50% volume of concrete. Coarse aggregates have great impact on the workability and strength of concrete [5-6]. In Pakistan normally hill sand is preferred as fine aggregate because it gives high packing between the ingredients of concrete, high density and improve the porosity of concrete [7-8]. The crushed stone is utilized as coarse aggregate in concrete. The utilization of hill sand and crushed stone as coarse aggregate in ample amount which reduces the natural resources day by day, in northern area of Sindh the hill sand is not available because of that its export from the natural pit aggregate areas which made the concrete un economical and In River Indus siltation problem is increasing day by day which resist the flow of water and wastages of water increases [6]. To overcome this problem, River Indus sand (RIS) and Recyclable Coarse Aggregate (RCA) were preferable to

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