

BII 06 Influence of fine aggregate type on the properties of high strength and high performance concrete

Udara G.R.I.,¹ Sooriyaarachchi H.P.,² Jayawardana V.G.R.P.¹

¹Graduate, Faculty of Engineering, ²Department of Civil and Environmental Engineering, Faculty of Engineering

Increase in construction activities have led to an increase in demand for raw materials especially river sand which is the conventional fine aggregate type used in concrete. With new regulation on river sand mining trend is to look for alternatives such as quarry dust offshore sand, dune sand and even manufactured sand. These often have different geological formation, different particle size distribution and different surface textures all of which could influence the properties of concrete. Influence of fine aggregate on the proportion of concrete has not been extensively studied. In this study influence of fine aggregate type on the making and performance of high strength and high performing concrete is evaluated. Development of high strength and high performing concrete for w/c ratio 0.4, 0.35 and 0.3 and the influence of fine aggregate on the properties of concrete are evaluated. It is noted that different rules for aggregate proportioning need to be adopted in order to produce higher workability (high performance) at lower W/C ratio (high strength). It is found that high strength concrete in excess of 100 MPa can easily be achieved with the locally available fine aggregate type with general purpose water reducing admixture in the market. Similar to the trends seen in the earlier study on normal concrete, offshore sand have produced highest strength at all the given W/C ratios. Water requirement to achieve the designated workability is found to be higher in quarry dust mixes. Similarly quarry dust mixes had highest shrinkage compared to other fine aggregate types. From a separate study, with uniform particle size distribution for different fine aggregate types, it is found that particle size distribution is the major factor influencing for strength of concrete for a given water cement ratio.

Keywords: concrete, fine aggregate types, particle size distribution, compressive strength, shrinkage.