THESIS TITLE : A STUDY OF MIX PROPORTIONING OF HIGH STRENGTH CONCRETE BY PASTE OVER-FILL

AUTHOR : MR.CHAKKREE TIYAWONGSUWAN

THESIS ADVISORY COMMITTEE :

Chairman
(Associate Professor Dr.Prinya Chindaprasirt)

Member
(Assistant Professor Piti Angsuwotai)

Member
(Mr.Surachet Mangmesri)

ABSTRACT

The objective of this research was to study a method of mix proportioning of high-strength concrete containing superplasticizer, based on the concept that the requirement of paste filled into the voids in the aggregate system is not sufficient to produce workability of concrete. Therefore paste over-fill is used to provide lubrication between the aggregate's particles to produce the required workability. This concept can be used as a starting point for proportioning of high-strength concrete mixtures in order to reduce the number of trial batches.

In this study of the effect of paste over-fill on workability, crushed limestone, river sand, portland cement, superplasticizer were used. The water-cement ratios of 0.26 and 0.30, and sand-aggregate ratios of 0.40, 0.50 and 0.60, with a superplasticizer dosage of 2 percent by weight of cement were used for the mix. The effect of amount of paste over-fill on workability characteristics of concrete viz. slump, slump flow diameter and DIN flow were

tested. The compressive strength and modulus of elasticity were tested on hardened concrete.

From the test, it was found that the workability was dependent on the amount of paste over-fill. The amount of paste over-fill was reduced with a decrease in the sand-aggregate ratios. The sand-aggregate ratio of 0.50 was optimal using least amount of cement content with no segregation. The amount of paste over-fill was reduced with an increase in the water-cement ratios. Concrete mixes at the water-cement ratio of 0.26 required the amount of paste over-fill between 3-7%. Concrete mixes at the water-cement ratio of 0.30 required the amount of paste over-fill between 1-3%. From the test on hardened concrete, the amount of paste over-fill within the range of this test had no effect on the the compressive strength. The compressive strength of tested concrete at the age 28 days ranged from 640 to 820 ksc. The Modulus of Elasticity ranged from 435,000 to 471,000 ksc., which were 13% higher than the values predicted from the formula ($E = 4270\ Wc^{1.5}\ \sqrt{f_c'}$, ksc).