STUDY OF THE BEHAVIOUR OF READY-MIXED CONCRETE

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Concrete is the most popular construction material in Sri Lanka. The reasons for its popularity are the economy, durability, constructability, and familiarity associated with concrete construction. Certain regions of Sri Lanka have entered into high degree of urbanization over the recent past. Colombo, Kandy, Galle and Kurunegala are some of the regions that fall into the above group. Concrete in ready-mixed form has extensively been used for construction under urbanization. The reasons for the heavy demand on ready-mixed concrete are: the limited space available for the storage of materials, the escalation of labour cost, the difficulty in producing concrete in bulk on site, quality controlling problems, and the scarcity of good quality materials.

The ready-mixed concrete mixing process is slightly different to that of normal on-site mixing. Site-made concrete is not normally added with a retarder, unless the setting time is to be delayed for a special reason. In contrast, a redarder is a common admixture in ready-mixed concrete, included for keeping the mix unset during the period of travel from the batching plant to the point of delivery. In Sri Lanka, only a few different retarders are available on the market. No specific guidelines are normally given by the manufacturer to the user on the dosage of the admixture for the appropriate delay of setting of concrete. The period of delay in setting is linked to the dosage of the admixture by a complex relationship. This involves a number of parameters which cannot be foreseen by the manufacturer of the admixture. Some of them are: ambient temperature, temperature of concrete ingredients, composition of cement, and water/cement ratio.

The study was carried out to control the most significant factors and to make guidelines on the use of a retarder. Throughout the experiment, the composition of the cement, temperature of materials and the ambient temperature were controlled.

The temperatures at which the test was conducted, viz. 15 $^{\square}$C, 25 $^{\square}$C, and 30 $^{\square}$C, were selected to cover the typical climatic range in Sri Lanka. The surrounding temperature was controlled by immersing the samples in an isothermal water bath. Materials were initially taken into the testing temperatures (i.e. 15 $^{\square}$C, 25 $^{\square}$C, and 30 $^{\square}$C). Standard penetration test (American Society for Testing and Materials, ASTM) was performed on screened mortar. From the test results, initial and final setting times were determined. Three different retarder dosages, i.e. 250 ml, 275 ml and 300 ml for 100 kg of cement, were used in samples for each testing temperature.

Finally, a computer model was developed based on the experimental results. The programme was written in Visual Basic 6. The programme can be used to estimate the retarder requirement at a particular temperature for the desired amount of delay in setting.