Abstract of B.Sc. Engg. (Civil) Thesis on

Part I

Studies on the Strength of Brick Aggregate Concrete with special reference to Curing Conditions, Discontinuous Curing and Testing Conditions

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The use of locally available ingredients to produce concrete of a particular designed strength makes concrete exclusive among the major construction materials. The ultimate strength of concrete is greatly influenced by the properties of ingredients, design standards, method of preparation, handling and curing condition.

In Bangladesh, concrete is mostly produced using broken bricks as coarse aggregate and Sylhet and/ or local sand as fine aggregate. But all leading design charts of the world are based on crushed stone as coarse aggregate. Again, at times, it may not be possible to provide a continuous curing to the concrete. Interruption in curing may affect the strength properties seriously. The testing conditions may also affect the strength properties of concrete. All these were studied and compared with those of stone aggregate concrete.

For this purpose, a concrete mix was designed for a particular strength of 4000 psi. In this mix design, indigenous materials like first class brick khoas as coarse aggregate, Sylhet sand as fine aggregate and Chattak cement as binder were used. After designing, a batch of concrete was cast into cylindrical moulds and were subjected to different curing conditions. The cylinders were then tested for both compressive and tensile strengths.

After 28 days of continuous moist curing it was observed that the concrete gained only 67% of its designed strength. The poor quality of cement was the main factor for this set back. This was confirmed from the investigation of the strength of neat cement paste. Despite the lack in proper strength, the trend of strength gain was quite logical for all sets of specimens under different curing conditions. It conformed to the earlier experiences on stone aggregate concrete.

The study on the effect of curing conditions on the strength of concrete revealed that continuous curing is the best way to achieve higher strength. The loss of strength due to interrupted curing can be substantially regained by starting curing within soonest possible time. In this event, a need for curing over a longer duration was observed. However, any discontinued curing at early ages (0 to 7th day) was found to cause irrecoverable loss in strength property.

The continuation of curing up to 6th month indicated that it may be a viable option in some cases to continue curing beyond 28th day. This results in an obvious increase in strength and thereby a higher safety margin against failure. In this study, an increase of strength over 20% was recorded by continuing curing up to 60th day.

The study on the effect of testing conditions on strength of concrete indicated a 12% over estimation of strength values due to drying up of the specimens before testing. The 28 day strength in tension was found to be only 9.5% of that in compression. These values are almost similar to the standard values as expected with stone aggregate concrete.