

Strength Variation in Structural Concrete Made With Coarse Aggregate Available In The Vicinity Of Karachi

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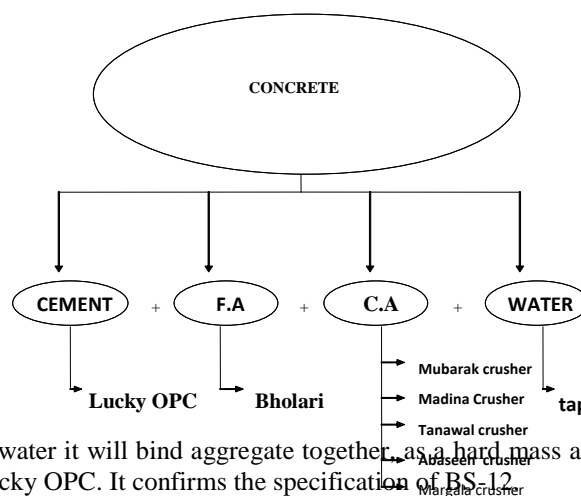
Abstract: Research and Development work was carried out in this regards basic properties of coarse aggregate were studied in the vicinity of Karachi. This project is included R&D of concrete mix 1: 2: 4 @ 0.5 W/C (Normal concrete) with various curried ages 3,7,14 and 28days (three, seven, Fourteen and twenty eight).Hilly sand named Bholari is used as fine aggregate and Cement OPC brand named Lucky contents were employed to study the behavior of two C.A sources My Garri and Raise goth, available in the vicinity of Karachi. My Gaari source crusher plants are Mubarak, Madina and Tanaawal. Raisegoth source crusher plants are Margala and Abaseen crusher. Engineering properties of C.A were as per guide line British code. Structural concrete research were carried out on the controlled specimen viz. standard cubes (6" x6" x6"). Compressive strength of five different Coarse aggregate made structural concrete were compared along with constant Bholari hilly sand and Lucky cement with configurations of material ratio 1 :2 :4 @ 0.5 W/C and curried age three, seven, fourteen and twenty eight days. Results of the present findings of five coarse aggregates are generally good for the use of this coarse aggregate material in construction. Nevertheless, test results are confirming the suitability of My Gaari based crusher plants coarse aggregate than the Raise goth based coarse aggregates.

Keywords: Aggregate, Concrete, Compressive strength, Karachi.

I. INTRODUCTION

Concrete is a composite construction material which consists cement (which is binded material) aggregate (which are inert filler) and water. Cement is being manufactured in factories so quality variation can be controlled easily. Aggregate are either natural or artificial (crushed in to required size from large boulders) and obtained from different parent rocks. So their properties may vary. In normal concrete construction, aggregate proportion could be more or approximately 3 quarters of the total volume, hence aggregate have an influence on the overall performance of structural member. Aggregate could be fine aggregate and coarse aggregate. It is general practices that C.A proportion in concrete is higher than F.A. It means the qualities of C.A is important factor in controlled qualities of structural concrete. It has been seen that construction industries of Pakistan is least bother about C.A qualities in concrete manufactured. Survey of various projects in the vicinity of Karachi also indicates that there is no attempts restriction on the use of any coarse aggregate irrespective of parent rock properties. It is also evident that some crusher plants are producing crushed stone aggregate from soft parent rocks and some are producing from hard parent rocks, hence the quality of concrete will provide a significant variation if such checks are not taken into account in manufacturing the structural concrete. Although many attempts have been made to study local materials such as crushed clay pelts, over burnt and normal bricks like crushed stone aggregate, but very little attempts have been made towards the different quarries of conventional crushed stone aggregate from five different sources located in the vicinity of Karachi. Keeping these problems in view a systematic study is designed to see the strength variation in structural concrete while using the different aggregate in the vicinity of Karachi.

II. MATERIAL USED IN PRESENT STUDY



A. Cement

Cement is a fine powder by adding water it will bind aggregate together as a hard mass after the hydration of water with in few days. In this research we use Lucky OPC. It confirms the specification of BS 12.

B. Water

Quality of water is used in this research for casting of cubes and curing had been similar as fit for drinking purpose. Water is free from organic matter, suspended solid and salts.

C. Fine Aggregate

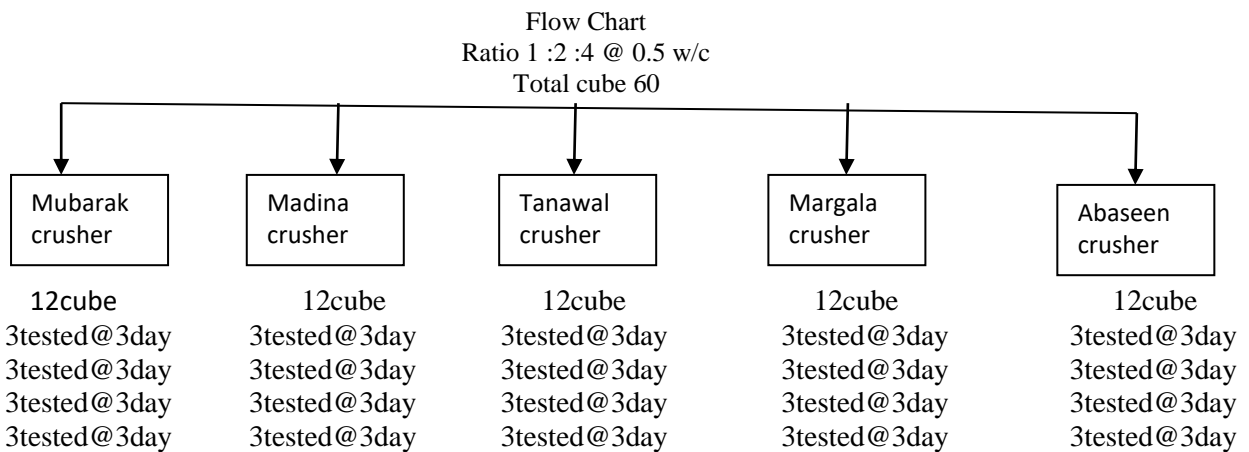
Bholari hill sand is used as fine aggregate which is confirm to zone II of BS 882.

D. Coarse Aggregate

In this research five crusher plants namely Mubarak, Madina, Tanawal, Margal, and Abaseen aggregate had been considered in the vicinity of Karachi. The engineering properties such as specific gravity were used in civil construction projects consider 2.5-3.0 with an average of 2.68, similarly water absorption specification range 0.1-2% is used.

III. EXPERIMENTAL PROGRAMME

Common mix proportion which are very familiar in current practice were tried to cost the control specimens that is 1:2:4 for normal concrete with water cement ratio 0.5. A mix ratio of 1:2:4 was applied to manufacture all the test samples for the study of different aggregate for concrete making pertaining for strength and workability. The size of concrete cube is 6" x 6" x 6" (150 x 150 x 150 mm) is casted in the Laboratory of Civil engineering department MUET Jamshoro. The mixing of concrete had been done with the help of electric revolving drum. Material was used by weighing processes. The mould is filled with concrete with three layers each layer was compacted twenty five blows by 5/8 in. diameter rod. After twenty four hours mould was open and cubes of concrete is kept into water tank for curing purpose.



IV. TEST RESULTS AND THEIR DISCUSSION

A. Compressive Strength of Concrete

According to experimental program given in flow chart above, the cube were casted, cured and tested as per work plan. The various coarse aggregate is chosen from different crusher plants available in the vicinity of Karachi. The crusher plants named are Mubark, Madina, Tanawl, Margala and Abaseen. The cube of concrete was casted from above quarries coarse aggregate along with Bholari hilly sand and Lucky OPC. The UTM which is available in the laboratory of Civil engineering department MUET Jamshoro were used to find out compressive strength of concrete cubes as per standard.

The Compressive strength of concrete cubes ratio 1 : 2 : 4@0.5 w/c. (coarse aggregate of Mubarak, Madina, Tanawal, Margala, and Abaseen crusher) have been described in Fig. 1 to Fig.5.

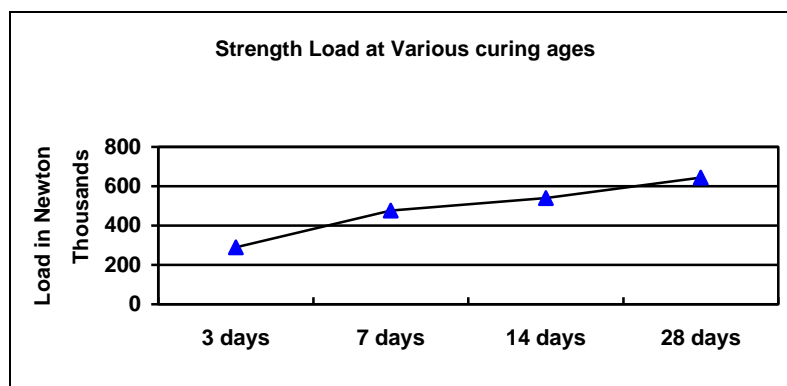


Fig 1. Compressive strength of structural concrete ratio 1 : 2 : 4 @ 0.5w/c (C.A Mubarak crusher)

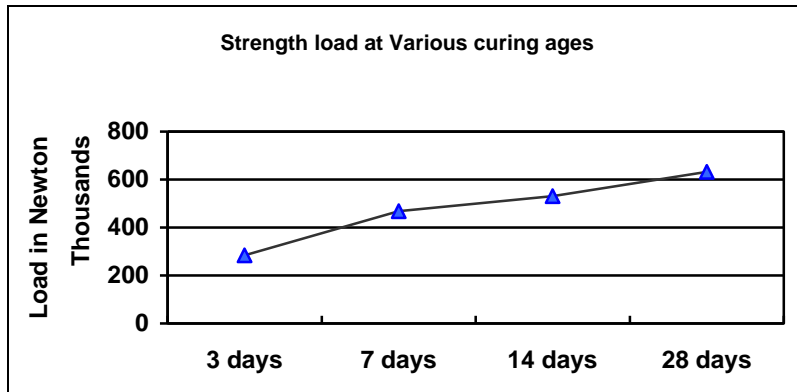


Fig 2. Compressive strength of structural concrete ratio 1 :2 :4 @0.5 w/c (C.A Madina crusher)

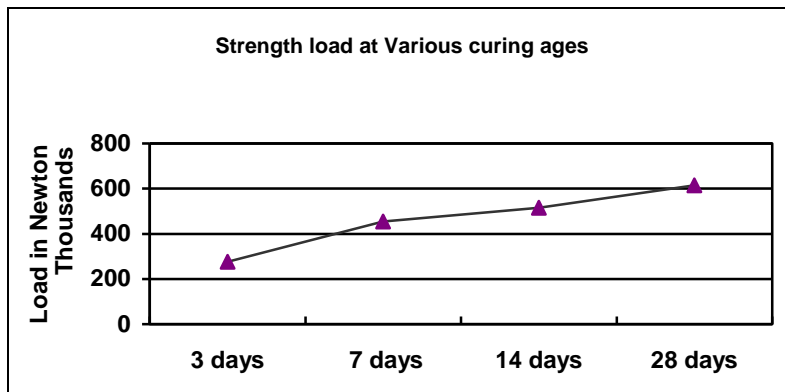


Fig 3. Compressive strength of structural concrete ratio 1 :2 :4 @ 0.5 w/c (C.A Tanawal crusher)

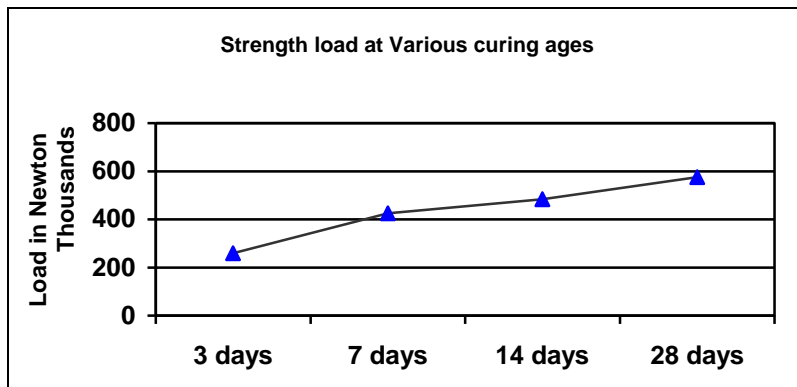


Fig 4. Compressive strength of structural concrete ratio 1 :2 :4 @ 0.5 w/c (C.A Margal crusher)

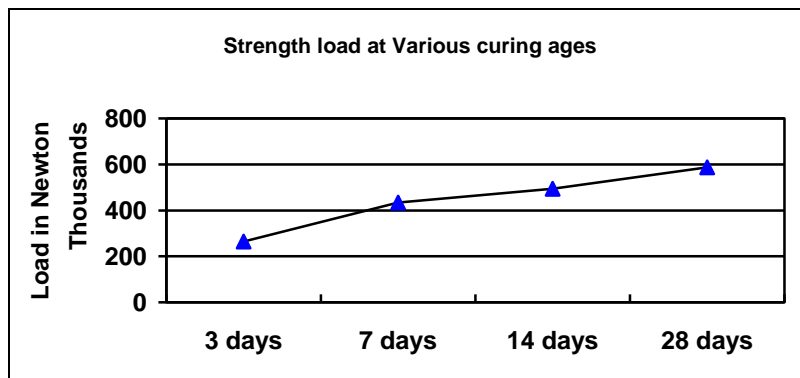


Fig 5. Compressive strength of structural concrete ratio 1 :2 :4 @0.5 w/c (C.A Abaseen crusher)

From the above Fig.1 to Fig.5 it is observed that the compressive strength is according to code suggestion of BS and ACI. 7th days compressive strength is more or less 2/3rd of 28th day compressive strength.

V. TEST RESULTS DISCUSSION AND COMPARISON

The C.A of five crusher plants were used in structural concrete ratio 1 :2 :4 @ 0.5 w/c are compared in Fig.6 below. Though the results are scattering a lot and there is no clear cut indication of the trend regarding remarkable difference. Neck to neck comparison of the test results with all the parameters are same except the source of aggregate which is discussed in the light of varying ages of curing is as under:

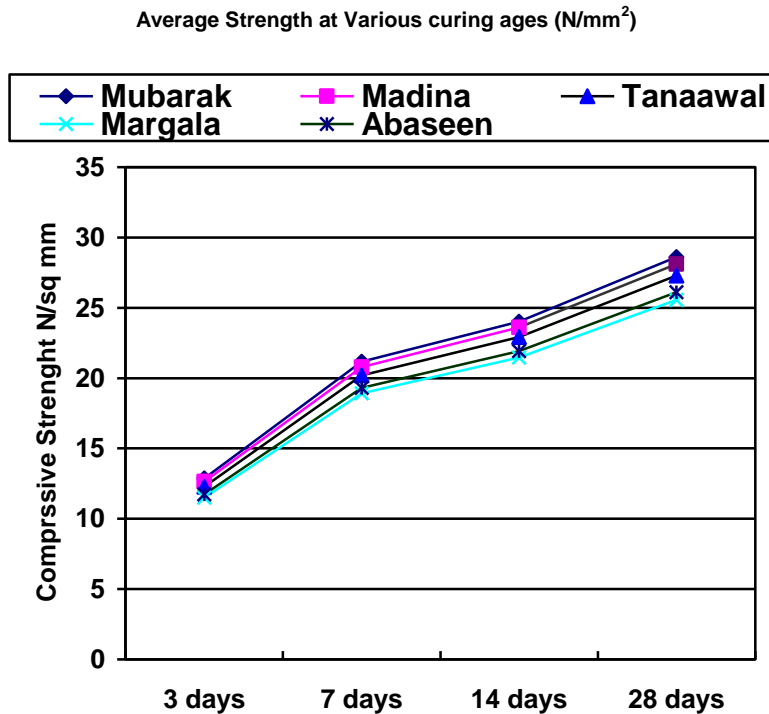


Fig 6.Comparission of compressive strength of structural concrete ratio 1 :2 :4 @ 0.5 w/c (C.A of five sources)

From Fig.6 it has been observed that three days strength results are inconsistent and there is no clear indication, however, it is clear that My Gaari based source aggregate crusher had given higher strength at early days in concrete. It is observed that among the source of My Gaari aggregate Mubarak crusher plants leads higher strength as compare to other aggregate crusher plant.

From Fig. 6 it has been observed that 7th day result of compressive strength show that all the My Gaari based crusher do produce better aggregate which has higher strength, but Mubarak had higher compressive strength than the rest of My Gaari based crusher plant produced C.A casted concrete ratio 1:2:4 @0.5 W/C .

From Fig. 6 it has been observed that 14th day result of compressive strength show that all the My Gaari based crusher plant do produce better aggregate which has higher strength, but Mubarak had higher compressive strength than the rest of My Gaari based crusher plant produced C.A casted concrete ratio 1 :2 :4 @0.5 W/C .

From Fig. 6 it has been observed that 28th day result of compressive strength show that all the My Gaari based crusher plant do produce better aggregate which has higher strength. Mubarak and Madina are running ahead then the all other crusher plants, but Mubarak had higher compressive strength than the rest of My Gaari based crusher plants produced C.A casted concrete ratio 1:2:4 @ 0.5 W/C ratio.

From the above discussion it is observed that C.A of My Gaari had given significantly higher strength than the C.A of Raise goth on 1:2:4 @ 0.5water cement ratio.

VI.CONCLUSIONS

3,7,14 and 28th day results of compressive strength shows thatcompressive strength results are indicating that all the My Gaari based crusher do produce better aggregate which has higher compressive strength than the Raise Goth based. Whereas Mubarak had higher compressive strength than the rest of My Gaari based C.A crusher plants.

VII. RECOMMENDATIONS

The present study was done on control condition so there is a need to study the practical models of structural members like beams, slabs, column incorporating various coarse aggregate available in Karachi before spreading these results to the construction industries.

This research is focus on only five source of coarse aggregate crusher plants, more sources of crusher plants and quarries should be included and research should encompass of all crusher plants quarries in the vicinity of Karachi.

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