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Evaluating The Strength Of Reinforced Masonry Block

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Abstract - *Problems related with construction site have been known for many years. Construction industry contributing to world of continuing population growth and economic development. The rising price of construction materials and also the ought to adhere to property, different construction materials are being wanted. To increase the applications of concrete solid blocks, greater understanding of products produced with locally available materials and indigenously produced mineral admixtures are important. In the present investigation, concrete blocks are produced with cement, fly ash and GGBS as cement replacement materials and locally available quarry dust as a replacement to fine aggregate. Ordinary masonry blocks have very low tensile strength though they are having required compressive strength. It is well established that compressive strength increases with the tensile strength. Therefore, an attempt made to increase the tensile strength to increase prism strength*

***Key Words*: Masonry solid blocks, Geogrid reinforcement, Fly ash, GGBS, Quarry dust Cement.**

1.INTRODUCTION

Construction industry have to support a world of continuing population growth and economic development. The rising cost of construction materials and the need to adhere to sustainability, alternative construction materials are being sought. To increase the applications of concrete solid blocks, greater understanding of products produced with locally available materials and indigenously produced mineral admixtures is essential. In the present investigation, concrete blocks are produced with cement, fly ash and GGBS as cement replacement materials and locally available quarry dust as a replacement to fine aggregate. Ordinary masonry blocks have very low tensile strength though they are having required compressive strength. It is well established that compressive strength increases with the tensile strength. In the present investigation the effects of partial replacement of ordinary Portland cement by fly ash and GGBS, fine aggregate by quarry dust and geogrid as reinforcement is studied. The work involved the collection of required raw materials for the production of solid blocks. Mix proportion of 1:5 (cement: quarry dust) were adopted and solid blocks with and without reinforcement were casted in egg laying machine. Aggregates less than 10mm size were used to attain the required stiffness during casting. As a further improvement, the blocks with and without reinforcement are casted by replacing cement with fly ash and GGBS (10% and 15% by weight of cement). The strength properties of these blocks were evaluated for 7 and 28 days by conducting compression and tension tests. The comparative studies of these results were carried out. The aim of this work is to ascertain the performance of concrete solid blocks and to replace conventional laterite masonry blocks.

2. Methodology

To evaluate the strength cement concrete blocks the various mixes are prepared which are following

I. Conventional mix
II. Conventional mix with geo grid mesh
III. Replacement of cement by fly ash and GGBS
   a. 10% Fly Ash and 10% GGBS
   b. 10% Fly Ash and 10% GGBS + Geo Grid Mesh
   c. 15% Fly Ash and 15% GGBS
   d. 15% Fly Ash and 15% GGBS + Geo Grid Mesh

A mix proportion of 1:5 is used.Cement, quarry dust and aggregate of size less than 10mm are mixed with appropriate amount of water in a machine operated concrete mixing machine.After 10minutes of proper mixing, the mix is carried to the egg laying machine and the mould is half filled with mix.It is vibrated and the geogrid is placed giving effective cover.The mould is then filled completely and it is vibrated and compacted.Mould is lifted slowly. The results of compressive and splite tensile strength are tabulated in following tables.

Fig -1: Placing of Geo Grid Mesh in between the Concrete Blocks

Mix	Average Compressive strength N/mm²	
	7 days	28 days
Conventional Mix	7.42	8.053
Mix with 10 % of mineral admixtures	7.89	10.83
Mix with 15% of mineral admixtures	5.83	7.77

Table.1 Average Compressive strength N/mm² without Geo grid mesh

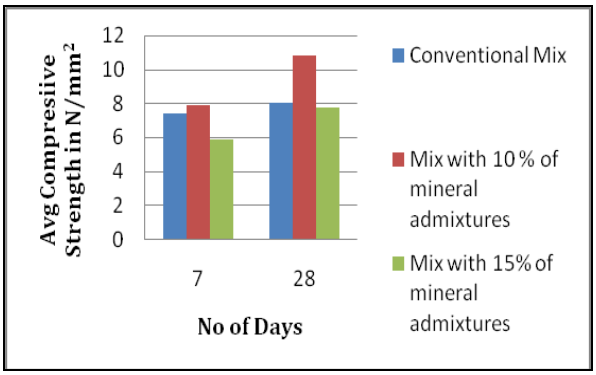

Fig -1: Average Compressive strength in N/mm² without Geo grid mesh

Mix	Average Compressive strength N/mm²	
	7 days	28 days
Conventional Mix	7.663	9.86
Mix with 10 % of mineral admixtures	10.6	13.94
Mix with 15% of mineral admixtures	6.165	9.00

Table.2: Average Compressive strength N/mm² with Geo grid mesh

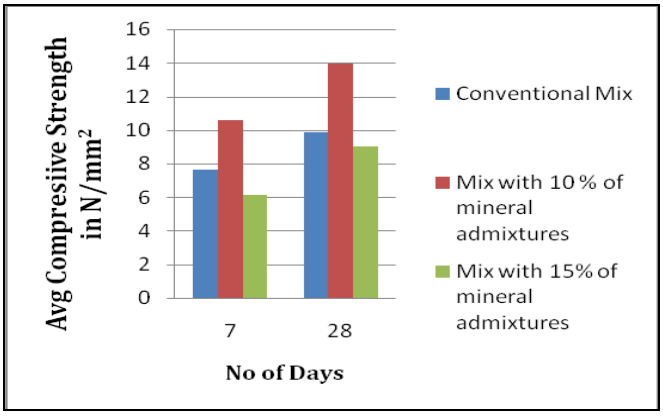

Fig -2: Average Compressive strength in N/mm² with Geo grid mesh

Mix	Average Split Tensile strength N/mm²	
	7 days	28 days
Conventional Mix	0.722	0.888
Mix with 10 % of mineral admixtures	0.94	1.77
Mix with 15% of mineral admixtures	0.777	0.94

Table.3: Average Split Tensile strength N/mm² without Geo grid mesh

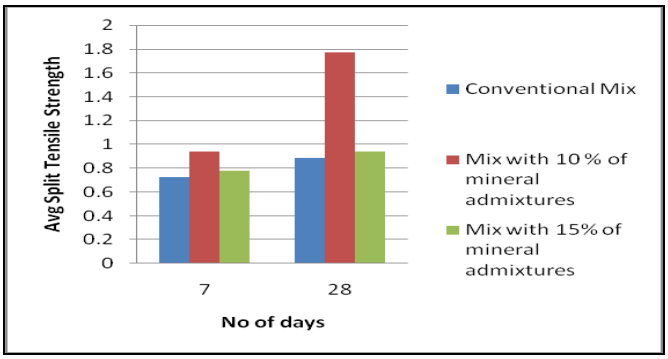

Fig -3: Average Split Tensile strength in N/mm² without Geo grid mesh

Mix	Average Split Tensile strength N/mm²	
	7 days	28 days
Conventional Mix	0.888	1.110
Mix with 10 % of mineral admixtures	1.166	2.11
Mix with 15% of mineral admixtures	0.833	1.275

Table.4: Average Split Tensile strength N/mm² with Geo grid mesh

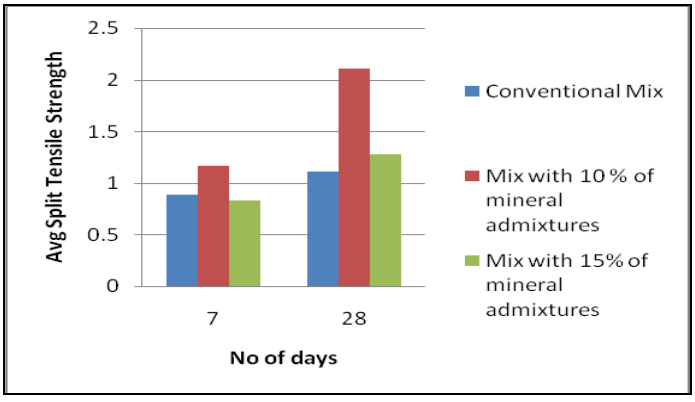

Fig -4: Average Split Tensile strength in N/mm² with Geo grid mesh

3. CONCLUSIONS

Experimental study has been carried out to produce masonry blocks by placing geogrid as reinforcement and using industrial wastes like fly ash and GGBS. The result of the experimental study has been found and it can be concluded that the blocks obtained can be used as a construction material with higher strength and durability. Based on the study following conclusions are drawn:

The compressive and Split tensile strength of fly ash and GGBS based reinforced masonry blocks is greater when compared to normal masonry blocks without geogrid reinforcement.

The thickness of these reinforced blocks is less than that of laterite and hence it enables us to build walls of less thickness, providing greater interior area.

The increase in strength properties of the blocks is because of the introduction of reinforcement and not because of higher density since it is found that the unit weight of the blocks remains almostconstant.

The failure in case of reinforced lock ccurs gradually and geogrid tends to hold the blocks together even after first crack occurs, causing increase in strength and the failure plane is vertical. In case of blocks which are not reinforced, failure occurs suddenly and the failure plane is inclined to the vertical.

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