Vijayabharathi.P, Aravindhkumar.J, Joshua Amarnath.D, Jayaprakash.H / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com
Vol. 3, Issue 2, March -April 2013, pp.1270-1272

Eco Friendly (Green Building) Material In Construction

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ABSTRACT

Concrete as a composite material the workability for placement and strength development with the age depend upon the constituent materials and their combined action. Now a day's environment has become a important aspect and keeping this in view in mind government has banned the lifting of sand from river bed in many areas. Hence there is a need to find the alternative material for sand. The conversion of large amount of available quarry dust in to an alternate source of sand will contribute not only as solution to the growing problem of waste disposal but it also conserve the resource of sand thereby reduce cost. In this project more than hundred concrete cubes were casted and tested using manufactured sand and quarry dust as fine aggregate.

A brick whose solid ingredient is 100 % fly ash has been manufactured. The manufacturing process uses the techniques and equipment similar to those used in clay bricks factories. The bricks produced were about 28% lighter than clay bricks. The bricks manufactured from fly ash possessed compressive strength higher than 40Mpa. This exceeds some of the best of load carrying clay bricks available common clay bricks. The new bricks and process have been patented and the bricks have been given the name fly ash bricks. This Paper present the result of testing and the advantages gained by this type of bricks over conventional clay bricks.

Key words: Quarry dust, Manufacturing sand, Compressive strength, Fly ash

INTRODUCTION:

Concrete is most widely used and versatile construction material possessing several advantages over steel and other constructions materials. It is difficult to point out another material of constructions which is as versatile as concrete.It is the material choice where strength, pemanance, durability.impermeability, fire resistance and abrasion resistance are required. It is so closed associated with every human activity that it touches every human being in his day to day living. The wide use of concrete are reduced the availability of fine aggregate. There is a scarcity of sand. As crusher dust is a waste material, available in abundance the project also helps in achieving economy in construction without compromising the strength characteristics of the blocks.

Similarly ever increasing volume of fly ash quantities in the world has not been remotely matched by its utilization. Australia is an example where such utilisation has been the partial replacement of portal cement. Australian shares most of western countries in similar methods and traditions as far as residential buildings are concerned. These include bricks as the main constituent. It is therefore natural that the brick industry presents an opportunity for the efficient utilisation of the vast quantities of fly ash in the concrete to generally a maximum of 25% replacement of Portland cement.

METHODOLOGY OF CONCRETE USING QUARRY DUST:

1) The quantities of material for one batch are weighed accurately.
2) Sand and cement first mixed in dry state thoroughly for getting a uniform mixture.
3) The coarse aggregate was then added and mixed thoroughly and uniformly.
4) The require quantity of water was divided in to two half added in the mix two stage.

And mixed until the concrete appears to be homogenous and good consistency.

Casting - Cast iron cubical moulds of size 150mm, which facilitates the removal of the casted

cubes without any damage are used. The interior surface of modulus was thinly coated with mould oil to prevent adhesion of concrete the mixed concrete was placed in the mould in layer approximately 50mm deep. Each layer was compacted with standard tamping rod and the strokes of bar were distributed in an uniform manner to have uniform mix

Curing - After 24 hours from the time of casting the specimens were remolded and immersed in water for curing. After 3, 7, 14, 21 and 28 days of curing, the concrete cubes were removed from water and made ready for testing.

$$\text{Compressive Strength of concrete cubes} = \frac{\text{Load at failure}}{\text{Cross Section area of the cube}}$$

PROPORTION OF FINE AGGREGATE:

- With the mix design obtained 1:4.25:3.26, the conventional concrete for M20 grade was casted
- The amount of sand is reduced by 10% to 50% and increasing the quantity of manufactured sand 10% to 50% , 9 cubes for each trial was casted
- Then the amount of sand was fully replaced by quarry dust and 18 cubes were casted for M20 grade concrete
- Later the sand is again replaced by manufactured sand and 18 cubes were casted for M20 grade concrete.
- Later the sand is again replaced by manufactured sand with respect to specific gravity and finess modulus, the amount of manufactured sand was decided and 18 cubes were casted.

MANUFACTURING PROCESS FOR FLY ASH BRICK:

Fly ash (70%) lime (10%) Gypsum (5%) and Sand (15%) are manually feed in to a pan mixer where water is added to the required proportion for homogeneous mixing. The proportion of raw materials.After mixing, the mixture are allowed to belt conveyor through feed in to automatic brick making machine were the bricks are pressed automatically. Than the bricks are placed on wooden pallets and kept as it for two days there after transported to open area where they are water cured for 10 to 15 days.The bricks are stored and checked before despatch.

RESULT AND DISCUSSION:

Table4.2.1 Compressive Strength of concrete with Partial Replacement Of Manufactured Sand

SI.NO	MIX DESIGNATION	COMPRESSIVE STRENGTH IN N/mm2		
		3 DAYS	7 DAYS	28 DAYS
1	S10	16.74	22.85	26.07
2	S20	17.62	23.5	27.11
3	S30	18.51	24.92	27.92
4	S40	18.66	25.03	29.14
5	S50	19.85	25.37	30.3

Table 4.2.2 Compressive Strength of Conventional Concrete

PARTICULARS	COMPRESSIVE STRENGTH IN N/mm2				
	3^{rd}	7^{th}	14^{th}	21^{st}	28^{th}
CONVENTIONAL CONCRETE	20.37	22.07	26.57	29.90	31.25

Table 4.2.3 Compressive Strength of Concrete with Complete Replacement of Sand by Quarry Dust and Manufactured Sand

PARTICULARS	COMPRESSIVE STRENGTH IN N/mm2				
	3^{rd}	7^{th}	14^{th}	21^{st}	28^{th}
QUARRY DUST	14.44	18.81	22.05	24.77	26.39
MANUFACTURED SAND	18.81	20.85	23.24	26.48	28.78

Testing of Fly ash bricks:

Property	Fly ash bricks
Compressive strength	44Mpa
Modulus of rupture	10.5Mpa
Initial rate of absorption	4.6kg/m2/min
Absorption capacity	9%
Average Density	1452 Kg/cum

The tensile strength expressed in the form of the modulus of rupture value is nearly three times the value for normal clay bricks. This is an achievement of considerable importance because it results in much less cracking in the bricks such cracking, whether caused by differential settlement.

CONCLUSION:

Quarry dust

- Manufactured sand can be used successfully for making concrete by replacing ordinary river sand for the desired strength of concrete.
- It can be concluded that if the sand is replaced by the manufactured sand in concrete
- It will not only reduce the cost of concrete but at the same time will save large quantity of natural sand. It will also reduce the pollution created due to the disposal of the quarry dust on valuable fertile land
- Manufactured sand achieving mean target strength at 14^{th} days itself
- The workability of concrete mixes decreased with an increased in percent of manufactured sand as partial replacement of sand
- Concrete with this replacement can attain compressive strength more than the target mean strength
- Test result indicates that manufactured sand can be used effectively.
- Manufactured sand due to their angular surface texture increase the concrete strength thus reflecting good bond strength.

FLY ASH BRICK

- The results are indicative of the satisfactory performance of fly ash bricks as load bearing elements. This type of bricks uses 100% fly ash without mixing with clay and shale. It therefore provides a large venue for the disposal of fly ash in very efficient useful and profitable way.
- The mechanical properties of fly ash bricks have exceeded those of the standard load bearing clay bricks. Notable among these properties are the compressive strength and the tensile strength compressive strength was 25% better than good quality clay bricks. tensile strength was nearly three times the value for standard clay bricks

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