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RESEARCH ARTICLE

EFFECTIVE AND EFFICIENT USE OF MARBLE DUST AND FLYASH IN CONCRETE.

Mohit Gupta.
Assistant Professor, Department of Civil Engineering, Indraprastha Engineering College, Ghaziabad.

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Abstract

The use of conventional concrete when used in large volume takes more cost as compared to modified concrete using the waste marble dust and flyash obtained from thermal power plant. Also the strength of concrete using marble dust and flyash increases upto a certain extent which proves to be more economical. As the cement content in concrete going to be decrease so the sustainable development of environment takes place which in turn makes effective in terms of health of people.

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Introduction:-

Concrete is the mostly used building material in the world and it is obtained by mixing cement, water, aggregate and sometimes admixtures in required proportions.

The Ordinary Portland Cement (OPC) is one of the main ingredients used for the production of concrete and has no alternative in the civil construction industry.

Unfortunately, production of cement involves emission of large amounts of carbon-dioxide gas into the atmosphere, a major contributor for green house effect and the global warming.

Objectives:-

1. To compare the change in compressive strength of concrete blocks due to addition of fly ash and marble dust.
2. To investigate the difference between manufacturing cost of traditional and modified concrete.
3. Utilization of waste product viz. fly ash and marble dust.

Literature Review:-

1. In year 2011, Mr. Mahzuz investigated that use of stone powder in place of sand increases the compressive strength of the concrete by 5 to 10%.
2. In year 2012, Mr. Divakar reported that in M20 replacement of sand upto 35% gives the satisfactory result.
3. In year 2013, Mr. Kartikey reported that in M15, M20 and M25 replacement of cement by fly ash upto 20% shows greater strength than replacement upto 40% or 60%.
4. In year 2015, Mr. Gaurav reported that addition of fly ash increases water cement ratio and decreases initial and final setting time.

Materials Used:-

Cement:-

a. Cement is a fine, gray powder .

Corresponding Author:-Mohit Gupta.
Address**:**-Assistant Professor, Department of Civil Engineering, Indraprastha Engineering College, Ghaziabad.

b. The cement and water form a paste that binds the other materials together as the concrete hardens.
c. The most commonly used cement is called ordinary Portland cement.
d. Ordinary Portland cement of different grades OPC-33, OPC-43 and OPC-53 are available in the market and are used for producing concrete.

Flyash:-
a. Fly ash is a by-product of the combustion of coal in thermal power plants.
b. Fly ash production has increased up to 900 million tonnes per year.
c. Concrete using fly ash is generally reported to show reduced segregation and bleeding
d. Replacement of cement by fly ash results in a reduction in the temperature rise in fresh Concrete.

Fine Aggregate (Sand):-
a. The sand used for the work should be conformed to Indian Standard Specifications IS: 383-1970.
b. The sand should be sieved through 4.75 mm sieve to remove any particles greater than 4.75 mm.

Coarse Aggregate:-
a. The crushed stone is generally used as a coarse aggregate.
b. The aggregates which is retained on IS sieve of 4.75 mm is termed as a coarse aggregate.

Marble Dust:-
a. Marble dust are generated as waste during the process of cutting of marble.
b. It is estimated that 175 million tons of marble waste are produced each year.

Methodology:-

Step 1 Problem identification
Step 2 Material Selection:
Cement, Marble dust , Fly ash, Fine aggregates, Coarse agg.
Step 3 Checking of physical properties of testing material .
Step 4 Mix Design
Step 5 Selecting different proportion of cementious material.
Step 6 :- Preparation of concrete blocks.
Step 7 :- Curing of concrete blocks.
Step 8 :- Testing of concrete blocks .
Step 9 :- Reporting of result.

Mix Proportion:-
All the samples were prepared using design M30 grade of concrete. Mix design was done based on I.S 10262-2009. The Table below show mix proportion of M30(Kg/m3)

Sr. No	Material	Quantity(Kg/m3)
1.	Cement (OPC)	350
2.	Fine Aggregate	812.75
3.	Coarse Aggregate	1076.23
4.	Water	186

Results:-

CUBE	CEMENT%	SAND%	COARSE AGGREGATE (%)	FLY ASH (%)	MARBLE DUST (%)	W/C RATIO	Compressive strength (N/mm2) 7 days	Compressive strength (N/mm2) 28 days
S1	100	100	100	0	0	0.45	22.9	33.3
S2	95	100	100	5	0	0.45	25.04	36.29
S3	90	100	100	10	0	0.45	26.23	38.3
S4	85	100	100	15	0	0.45	28.59	41.55
S5	80	100	100	20	0	0.45	27.83	38.8

S6	75	100	100	25	0	0.45	24.49	36.05
S7	70	100	100	30	0	0.45	21.25	31.58
S8	65	100	100	35	0	0.45	20.15	30.31
S9	100	95	100	0	5	0.45	24.7	34.75
S10	100	90	100	0	10	0.45	26.24	36.5
S11	100	85	100	0	15	0.45	29.35	40.1
S12	100	80	100	0	20	0.45	31.8	41.8
S13	100	75	100	0	25	0.45	28.36	39.85
S14	100	70	100	0	30	0.45	27.5	37.32
S15	100	65	100	0	35	0.45	25.1	35.13

Conclusion:-

a. At the addition of 85% of cement and 15 % of fly ash maximum compressive strength is obtained i.e., 41.55N/mm^2.
b. At the addition of 80% of sand and 20% of marble dust maximum compressive strength is obtained i.e., 41.80 N/mm^2.
c. Cost difference b/w Traditional and Modified concrete
   Traditional concrete cost =76.34Rs/cube
   Modified concrete by fly ash =75.143Rs/cube
   Modified concrete by marble dust=74.97Rs/cube
   So, the cost of concrete has been reduced as compare to traditional cost.
d. Since the waste material has been used in this project investigation can helps in reduction of pollution.

References:-

1. IS 456:2000 (plain and reinforced concrete)
2. IS10262:2009(concrete mix proportioning – guidelines)
3. SSRG international journal of civil engineering (ssrg-ijce)-volume 3 issue 8- august 16
4. International journal of engineering trends and technology(ijett)-volume 44 number 5- feb 17
5. International journal of science technology and
6. engineering|volume 2|issue 6| december 15
7. International research journal of engineering and technology|volume:3 | issue :07| july 16