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EXPERIMENTAL STUDY ON PROPERTIES OF HIGH VOLUME FLYASH CONCRETE

Srishadurya. P[1], Selvaprasanth P[2]

[1&2]*Assistant Professor, Department of Civil Engineering & Planning, SNS College of Technology, Coimbatore, Tamil Nadu*

Abstract - *The aim of this study is to evaluate the performance of concrete using bottom ash. Concrete is the most extensively used construction material in construction industry. The addition of industrial by-products as supplementary cementitious materials has dramatically increased along with the development of concrete industry, due to the consideration of cost saving, energy saving, environmental protection and conservation of resources. The environmental concerns both in terms of damage caused by the extraction of raw materials and carbon dioxide emission during cement manufacture have brought pressures to reduce cement consumption by the use of industrial by-products. This study includes the physical and chemical properties of bottom ash and the mix design for M40 grade concrete with different replacement of bottom ash for cement.*

Key Words *High volume fly ash concrete*

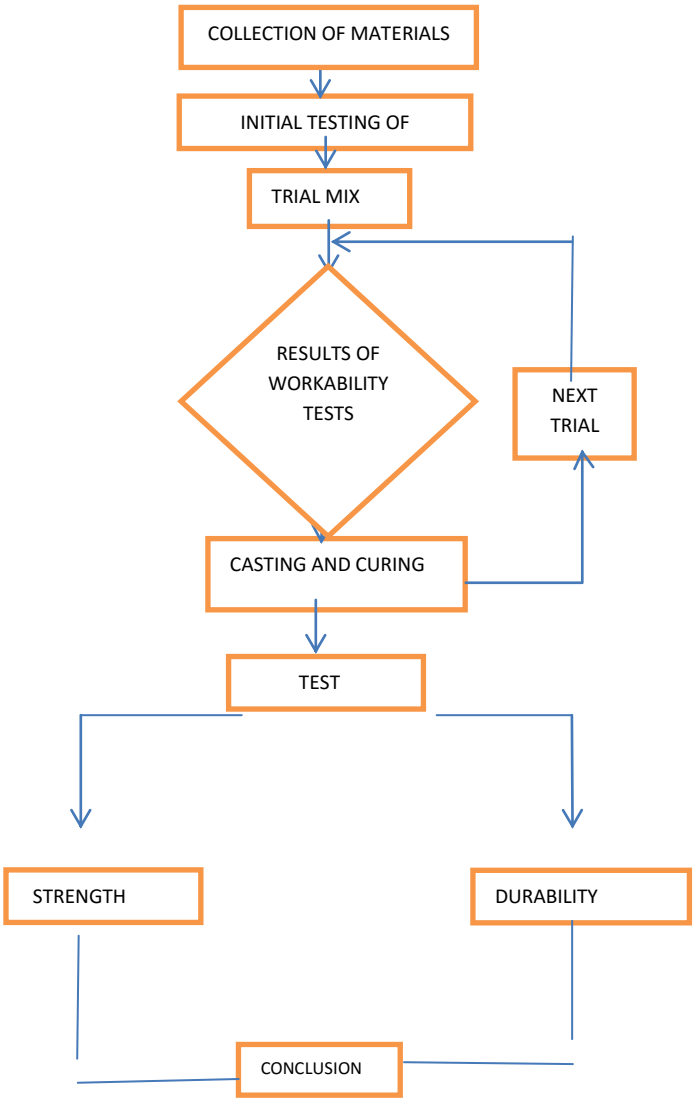
1. INTRODUCTION

Concrete is the most extensively used material in civil engineering construction so that considerable attention is taken for serviceability of the structure depended upon the properties of concrete with respect to strength and durability. India's total installed capacity of cement stood at 320 million tonnes per annum (MTPA). Carbon concentration in cement spans from approximately 5% in cement structures to 8% in the case of roads in cement. The cement industry produces about 5% of global man-made CO2 emissions, of which 50% is from the chemical process, and 40% from burning fuel. The amount of CO2 emitted by the cement industry is nearly 900 kg of CO2 for every 1000 kg of cement produced. Industrial waste like fly-ash which is dumping to creating environmental problems, is mainly used as a building material due to its low cost and easy availability and its adoption will enable the concrete construction industry to become more sustainable.

In recent years, many researches are going on for improving the HVFAC properties of concrete with respect to strength, durability and performance as a structural material. The aim of the study is to investigate the flexural strength and durability properties of the HVFA concrete.

2. METHODOLOGIES

The main objective of this research is to study on properties of high volume fly ash concrete.



3. CASTING OF TEST SPECIMENS

The soil sample is selected based on the comparison of properties of various types of soil which is listed in Table I. From the comparison of soil, the black cotton soil has high plasticity, high liquid limit and it is highly expansive soil. Due to this property, black cotton soil has low bearing capacity and low strength. Hence this research aims to improve the

4. CASTING OF TEST SPECIMENS

Mix proportion for per m^3:

Table 1 HVFA composition

mix	Cement	Fly Ash	Fly Ash	Fine Aggregate	Coarse Aggregate	w/c	water	super plasticizer
1	448	0	0	732	1125	0.330	148	2.240
2	268	40	180	732	1125	0.330	148	2.240
3	224	50	224	732	1125	0.330	148	2.240
4	180	60	268	732	1125	0.330	148	2.240

The concrete cubes of size 15 cm x 15 cm x 15 cm were cast by using conventional concrete. The specimens were de-moulded after 1 day and immersed in water for 7, 28 days for curing. After 7 and 28 days concrete cubes were tested as per IS 516 – 1956. The test was conducted in compression testing machine.

The load was applied at the rate of approximately 140 kg/cm2/min until the failure of the specimen. The maximum load applied to the specimen until the failure was recorded

Table 2 Cube test for Mix design

S.NO	W/C RATIO	CEMENT	SAND	COARSE AGGREGATE	COMPRESSIVE STRENGTH N/mm2			
					7 days	28 days		
A1	0.364	407	752	1131	25	25.5	38	38.67
A2	0364	407	752	1131	26		38	
A3	0.364	407	752	1131	25.5		40	
B1	0.330	448	732	1125	28.8	27.9	40	39.67
B2	0.330	448	732	1125	27		39	
B3	0.330	448	732	1125	28		40	

CONCLUSION:

The 7 and 28 days test results for concrete from that the water – cement ratio of 0.330 gives a maximum compressive strength then to adopt the mix design for M40 is448 : 732 : 1125 : 0.330.

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