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The Partially Replacement of Cement in Concrete by Using GGBS and Baggage Ash and Its Application in Paver Block

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ABSTRACT

The Paper is based on the experimental investigation. The main objective to Study the Effect of Partial Replacement of Cement by GGBS and baggage ash Check the Compressive Strength and tensile strength of Concrete by Using M30 Grade of Concrete. The materials GGBS and baggage ash is mixed and both are replaced in Percentage (i.e. 10%, 20%, 30%) to the Cement and Checking the Compressive Strength After 7 days 14days and 28 days of Curing. And Optimum Percentage of Replacement of Cement is Found Out.

Keywords : GGBS, Baggage Ash ,Compressive Strength, Spilt Tensile Strength etc.

I. INTRODUCTION

The Construction sector is increases in day to day life. This Growth have Some Bad Impact on Environment and Human health. Therefore we required an ecofriendly and Economical material. GGBS and baggage ash by using into concrete the cement cost is Reduces. The Strength increases and their will be effective utilization of waste material. Cement is very costlier material in concrete and by Replacing the cement with the GGBS and baggage ash. The cost of producing the concrete will be minimized. In this Experiment, we have tested sum of 30 cubes for 14 days and 28 days of curing with the varying percentage of GGBS and ash and Compare the Result with Conventional Concrete.

The conventional concrete consists of cement, sand and granite aggregates. Cement is determined the global economy, because of an indispensable for construction purposes. When the cement is in production stage, it releases greenhouse gases. During production, limestone releases CO_2 directly as a results of heat reaction, which may lead to depletion of ozone layer. The CO_2 emission is directly related to how much quantity of cement used in the concrete mix. For example, 900 kg of CO_2 are emitted during the manufacture of each ton of cement. The cement may be reduced by using the other cementing materials.

Therefore there is main objective to reduces baggage ash from the factory plants may be replaced with cement as a replacement.

II. GROUND GRANULATED BLAST FURNACE SLAG

The Ground granulated blast-furnace slag is the granular material formed when molten iron blast furnace slag is rapidly chilled by immersion in water. It is a granular product with very limited crystal formation, is highly cementious in nature and, ground to cement fineness, and hydrates like port land cement. So we use the waste G.G.B.S. in concrete to become the construction economical as well as eco-friendly. The G.G.B.S. used in the present study. This material replaces the cement in mix proportion.

III. BAGGAGE ASH

It is by product of sugarcane factory. It creates bad impact on the environment. There should necessity to effective use of these ash and disposal of it. The concept is arise to use in concrete due to this problem.

IV. OBJECTIVES

1) To study the effect on Compressive strength by replacing cement with baggage ash and GGBS.
2) To compare result of normal concrete with GGBS concrete.
3) For effective utilization of waste Baggage ash which is by product of sugarcane factory.
4) To reduce the cost of cement.
5) To reduce cost of concrete by reducing cement content.
6) To increase strength of concrete by reducing cost of concrete.
7) It is used for PCC work.

V. SCOPE OF PROJECT WORK

1) For low cost construction work.
2) For increasing strength by reducing cement content.
3) To reduce environmental impact due to baggage ash.
4) Using locally available materials.
5) Effective utilization of waste material.
6) It is used for paver block and compound wall.
7) To reduce the cost of construction.

MATERIAL –BAGGAGE ASH

Material –GGBS

VI. METHODOLOGY

Prepare mix design of m30 grade concrete by using is method

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Normal concrete

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Using GGBS and baggage ash (10% replacement)

Using GGBS and baggage ash (20% replacement)

Using GGBS and baggage ash (30% replacement)

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Casting of cubes and cylinders (with varying of % of materials)

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Curing of these cubes for 7,14 & 28 days and cylinders for 28 days.

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Testing of these cubes and cylinders.

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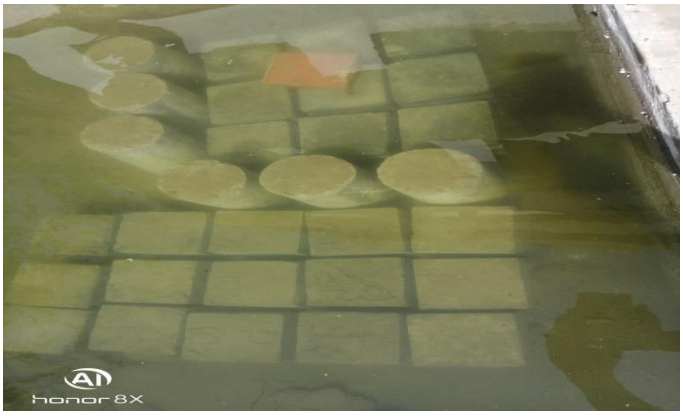
Comparing normal and Partially replaced concrete result



VII. TESTING DETAILS

COMPRESSIVE STRENGTH TEST

SPILT TENSILE STRENGTH TEST

VIII. RESULT

Following are the result of compressive test carried on % of varying of GGBS and Baggage Ash.

1) Normal concrete (N/mm²)

Sr. No.	Days	C/S Area (mm²)	Load (KN)	Comp. Strength (N/mm²)	Avg. Comp. strength (N/mm²)
1	7	22500	497.3	22.5	21.40
2			475	21.11	
3			465	20.66	
4	14	22500	633.8	28.16	27.89
5			602.3	26.76	
6			647.4	28.77	
7	28	22500	893.7	36.6	38.67
8			920.8	40.92	
9			866.1	38.49	

2) 10% replacement to Cement(N/mm²)

Sr. No.	Days	C/S Area (mm²)	Load (KN)	Comp. Strength (N/mm²)	Avg. Comp. strength (N/mm²)
1	7	22500	244.6	10.8	10.72
2			219.5	9.7	
3			265	11.7	
4			426.2	18.9	
5	14	22500	404.9	17.9	18.16
6			399.7	17.7	
7	28	22500	544.4	24.1	29.73
8			671.9	29.4	
9			804.9	35.7	

3) 20% replacement to Cement (N/mm²)

Sr. No.	Days	C/S Area (mm²)	Load (KN)	Comp. Strength (N/mm²)	Avg. Comp. strength (N/mm²)
1	7	22500	200	8.8	10.76
2			287.6	12.78	
3			240.8	10.70	
4	14	22500	374.8	16.6	18
5			414.5	18.4	
6			429.5	19	
7	28	22500	695.4	30.9	30.60
8			735.9	32.7	
9			634.9	28.21	

4) 30% replacement to Cement (N/mm²)

Sr. No.	Days	C/S Area (mm²)	Load (KN)	Comp. Strength (N/mm²)	Avg. Comp. strength (N/mm²)
1	7	22500	186	8.2	8.56
2			201	8.9	
3			193.9	8.6	
4	14	22500	266.2	11.8	13.66
5			341.5	15.1	
6			318.7	14.1	
7	28	22500	414.4	18.4	19.1
8			395.2	17.5	
9			448.5	19.9	

Spilt Tensile Strength Result (28 Days)

Sr. No.	Sample	Load (KN)	Spilt Tensile Strength (N/mm²)	Avg. Spilt Tensile strength (N/mm²)
1	0%	280.3	3.96	3.9
2		284.8	4.021	
3		270.4	3.82	
4	10%	226.7	3.2	3.26
5		235.7	3.33	
6		230.4	3.25	
7	20%	236.1	3.34	3.29
8		230.2	3.25	
9		233.7	3.30	
10	30%	147.8	2.09	2.01
11		136.5	1.93	
12		140.6	1.98	

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IX. CONCLUSION

1) It has been concluded that upto 20% replacement concrete is effective used for the development of paver block.
2) The workability of concrete had been found to be decrease with increase of Baggage ash but the GGBS increases the workability of concrete.
3) It has been seen that upto 20% replacement is effective for conventional concrete.
4) The cost of cement concrete is reduced.
5) The waste material is effectively utilized by using above method.
6) It is effective method for disposal of baggage ash and disposal cost is avoided.
7) This is an effective method of increasing strength by reducing cost.
8) The strength are reduced for 30% replacement of materials.
9) The partial replacement of OPC in concrete by GGBS, is not only economical but also facilitates environmental friendly disposal of the waste.
10) The usage of GGBS in concrete as cement replacement materials will lessen the CO_2 is being emitted during its manufacture and acts as an eco-friendly material reducing the Greenhouse effect.

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