INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume3, Issue5)

Available online at www.ijariit.com

Effects of Glass Powder and Brick Aggregate on M-25 Concrete

V. Gokulnath
Student
Civil Engineering Department
Saveetha University, Tamil Nadu
soumithreddy95@gmail.com

T. Soumith Reddy
Student
Civil Engineering Department
Saveetha University, Tamil Nadu
soumithreddy95@gmail.com

Nalamothu Nagachandu
Assistant Professor
Civil Engineering Department
Saveetha University, Tamil Nadu
chandunag8185@gmail.com

Abstract:

Glass powder

Concrete is a mix of bond, sand, coarse total and water. The key factor that increases the value of cement is that it can be intended to withstand harshest situations critical part. Today an unnatural weather change and ecological decimation have turned out to show hurts as of late, worry about natural issues, and a changeover from the mass-squander, mass utilization, large-scale manufacturing society of the past to a zero-radiation society is currently seen as noteworthy. Typically glass does not hurt nature at all since it doesn't radiate contaminations, however, it can hurt people and additionally creatures if not managed precisely and it is less benevolent to condition since it is non-biodegradable. In this way, the improvement of new advancements has been required. The term glass contains a few compound assorted varieties including pop lime silicate glass, salt silicate glass and boro-silicate glass. To date, these sorts of glasses glass powder have been broadly utilized as a part of the concrete and total blend as pozzolana for common works.

Brick aggregate

The supportable development idea was acquainted due with the developing worry about the eventual fate of our planet since development industry is an immense buyer of normal assets and, at the same time, a waste maker. Concrete blocks industry is viewed as one of the greatest normal asset buyers. In any case, it might be utilized as a potential place for reusing squanders, in view of its composite nature (i.e., bond, water, and totals). Totals in strong bond blocks contain around 60– 75% of the aggregate volume, so any lessening in characteristic totals' utilization will have huge effects. Reusing of squanders as regular totals are monetarily suitable as well as it is considered as an ecological amicable approach. Mud blocks are generally utilized as a part of Egypt. The amount of stonework annihilation squander is assessed to be around 2– 3 and 1.5 times higher in structures with stack bearing workmanship and fortified cement surrounded brickwork infill as basic frameworks, individually. As needs are, a critical part of decimation squanders is earth blocks. Also, block fabricating industry creates extensive amounts of rejected let go blocks due to being off-standard (i.e., broken, mutilated, under-consumed, or over consumed). The off-standard blocks are sold for arranging purposes, if monetarily possible, yet generally dumped into destinations around the block industrial facilities causing natural issues. Consequently, the reusing of squashed blocks as option totals has a specific enthusiasm as it can impressively lessen the issue of waste stockpiling and then again can help in the conservation of characteristic totals. Besides, concrete containing coarse smashed blocks had a generally bring down quality at early ages than typical total cement. This is because of the higher water ingestion of pounded block totals contrasted with regular totals.

***Keywords*: Glass Powdered, Brick Aggregate, Compressive Strength etc.**

1. INTRODUCTION

1.1. Materials:
CEMENT: ordinary Portland cement (OPC) of M53 grade is used in casting as shown in fig 01

Figure No: 01

AGGREGATE: coarse aggregate which is sieved at a size of 20mm is used. As well as a fine aggregate which is sieved through 2.35mm sieve is used.

WATER: Tap water which is suitable for construction is used.

GLASS POWDER: Glass powder is finest Powder is added to improve its strength

BRICK AGGREGATE; Bricks are break into brick aggregate and used

Mix proportion: The ratio 1:1:2 is followed where 1= cement, 1= fine aggregate, 2= coarse aggregate by volume and the water-cement ratio is 0.45

1.2.1. METHODOLOGY

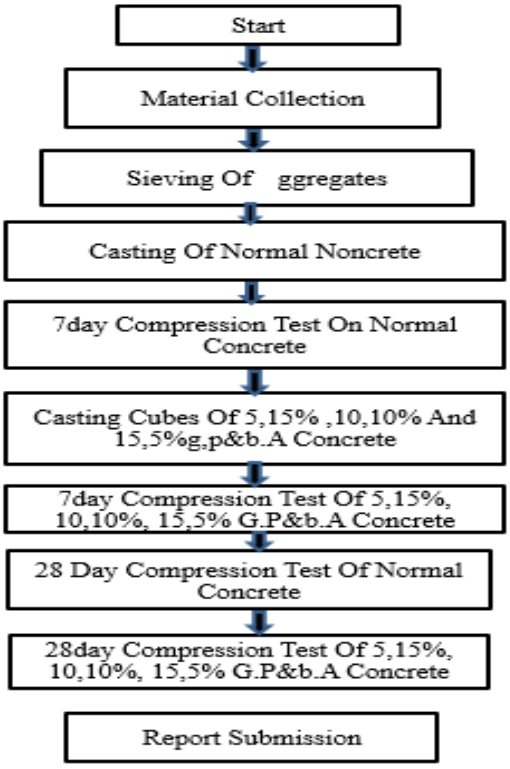


Figure No: 02

2. REVIEW OF LITERATURE

a). Ashutosh Sharma and Ashutosh Sangamnerkar, '' Glass Powder – A Partial Replacement for Cement? 'International Journal of Core Engineering & Management (IJCEM) Volume 1, Issue 11, February 2015

In this paper has been studied in the experimental study of glass powder as replacement of cement in concrete. In this paper, the glass powder is 5%, 10%, 15% replaced as cement in concrete to find compressive strength. This paper result indicates maximum strength gain at 10% replacement of glass powder.

b) Shilpa Raju and Dr. P. R. Kumar, '' Effect of Using Glass Powder in Concrete'' International Journal of Innovative Research in Science, Engineering and Technology Volume 3, Special Issue 5, July 2014
This study explains as the percentage of glass powder increases the compressive strength of concrete decreases. In this paper considering the strength criteria, the replacement of cement by glass powder is feasible. In this paper results, we conclude that the utilization of waste glass powder in concrete as cement replacement is possible.

c) M. N. Bajad**, Research Scholar, S.V.N.I.T, Surat,** C. D. Modhera**, Professor, S.V.N.I.T, Surat and** A. K. Desai**, Associate Professor, S.V.N.I.T, Surat.**
Higher strength was achieved when 20% cement was replaced by glass powder in concrete. The density of concrete reduces with the increase in the percentage of replacement of cement by glass powder. Considering the strength criteria, the replacement of cement by glass powder is feasible. It is recommended that the utilization of waste glass powder in concrete as cement replacement is possible.

d) R.Vandhiyan, K. Ramkumar and R. Ramya, ''Experimental Study On Replacement Of Cement By Glass Powder'' International Journal of Engineering Research & Technology (IJERT) Year of publication: May 2013.
Cement was replaced by the glass powder in the proportion of 5%, 10%, and 15%.The compressive strength test on both conventional and glass added concrete was performed on standard compression testing machine of 3000kN capacity. Replacement of glass powder in cement by 20%, 30%, and 40% increases the compressive strength by 19.6%, 25.3% and 33.7% respectively. Replacement of glass powder in cement by 40% increases the split tensile strength by 4.4% respectively. Replacement of glass powder in cement by 20%, 30%, and 40% increases the flexural strength by 83.07%, 99.07% and 100% respectively.

e) MS H. Vishaliny has studied in the experimental use of glass powder as replaced in cement as 20%, 30% and 40% increases the compressive strength by 19.6%, 25.3%, and 33.4% respectively. The results indicate the Very finely ground glass has been shown to be excellent filler and may have sufficient pozzolonic properties to serve as a partial cement replacement, the effect of ASR appear to be reduced with finer glass particles, with replacement level.

f) Md. Kobir Hossain, Mohammad Abdur Rashid, and Md. Rezaul Karim, ''Recycling of Brick Aggregate Concrete: Physical and Mechanical Properties'' Research Associate, Department of Civil Engineering, University of Asia Pacific, Bangladesh
It has experimented on brick aggregate concrete and explained the concrete of compressive strength up to 30 MPa can be easily achieved using crushed brick aggregate without using any admixture. This paper explains the compressive strength increases with aggregate size up to 25 mm and decreases as the aggregate size increases beyond 25 mm**.**

g) Mr. G. S. Patil, ''Use of Brick Aggregate in Standard Concrete and Its Performance in Elevated Temperature'' IACSIT International Journal of Engineering and Technology, Vol. 5, No. 4, August 2013.
It has experimented on brick aggregate concrete the coarse aggregate was replaced by brick aggregate as 20% and 40%. The results of compressive strength obtained at 7 days are 9.23%, 12.08% and at 28 days is 10.02% and 11.95%. Again he replaces 60% and 80% of brick aggregate as coarse aggregate the compressive strength obtained at 7 days was found 5.69%, 9.25% lower than that of conventional concrete and at 28 days the compressive strength was decreased by2.72% and 6.87% respectively.

h) Farid Debieb a, Said Kenai b, ''The use of coarse and fine crushed bricks as aggregate in concrete'' a Civil Engineering Department, University of Me´de´a Algeria b Geomaterials Laboratory, Civil Engineering Department, University of Blida, Blida, Algeria Received 1 November 2005; received in revised form 7 December 2006; accepted 20 December 2006 Available online 7 February 2007
Recycled brick aggregates present relatively lower bulk density and higher water absorption compared to natural aggregates. Densities of crushed bricks concrete were found to be lower (up to 17%) than those of natural aggregates concrete. Concrete with 100% of coarse and fine aggregates presented some segregation and hence de-molding was delayed until 56 h after casting. The

decrease in compressive strength at 28 days of age was about 35, 30 and 40% when coarse, fine or both fine and coarse aggregates are respectively, substituted.

3. EXPERIMENTAL PROCEDURE

MATERIAL PROPORTIONS

MATERIAL	TYPE/ORIGIN	QUANTITY
Cement	OPC 53 Grade	60kg
Fine Aggregate	2.35 mm sieved	60 kg
Coarse Aggregate	20mm	120kg
Glass powder		15kg
Brick Aggregate		15kg
Water Cement Ratio		0.45
Mix design		1:1:2

PREPARATION OF CUBE SPECIMENS

The proportion and material for making these test specimens are from the same concrete used in the field.

SPECIMEN:

3 cubes of 15 cm*15cm*15cm size we need to apply oil or grease for the cube and tighten the screws of cube as shown in figure 03

Figure No: 03

3.1. MIXING: Mix the concrete either by hand or in a laboratory batch mixer as shown in figure 03

Figure No: 04

3.2HAND MIXING

- Mix the cement on a watertight none-absorbent platform until the mixture is thoroughly blended and is of uniform colour.
- Add the coarse aggregate and mix with cement and fine aggregate until the coarse aggregate is uniformly distributed throughout the batch.
- Add water and mix it until the concrete appears to be homogeneous and of the desired consistency.

3.3. SAMPLING

- Clean the mounds and apply oil
- Fill the concrete in the moulds in layers approximately 5cm thick
- Compact each layer with not less than 35 strokes per layer using a tamping rod as shown in fig 05

Figure No: 05

- Level the top surface and smoothen it with a trowel

3.4. CURING

The test specimens are stored in moist air for 24hours and after this period the specimens are marked and removed from the moulds and kept submerged in clear fresh water until taken out prior to the test.

Figure No: 06

3.5. PRECAUTIONS

The water for curing should be tested every 7days and the temperature of the water must be at 27+-2^{0}C.

4. RESULTS AND DISCUSSION:

The tests conducted on concrete mix are as follows

4.1. NORMAL CONSISTENCY TEST:

Time	Penetration Reading
0	0
5	0
10	0
15	0
20	0
25	3
30	7

4.2. INITIAL SETTING TIME TEST

Quantity Of Cement Taken (Grams)	Percentage Of Water	Amount Of Water (Ml)	Penetration Reading
400	25%	100	33
400	30%	120	25
400	35%	140	16
400	34%	152	7

4.3. FINAL SETTING TIME TEST

NAME OF THE TEST	RESULT
Final Setting Time	600minutes(10 Hours)

4.4. SLUMP CONE TEST

Slump Value For Conventional concrete (Mm)	Slump Value For 5%G.P & 15% B.A (Mm)	Slump Value For 10%G.P & 10% B.A (Mm)	Slump Value For 15%G.P & 5% B.A (Mm)
61	60	57	55

4.5. COMPRESSIVE STRENGTH TEST OF CONVENTIONAL M25 CONCRETE (7,28 DAYS)

specimen	compressive strength(7days)	compressive strength(28days)
CUBE 1	18.54	28.1
CUBE 2	17.23	28.23
CUBE 3	17.94	27.64

4.6. COMPRESSIVE STRENGTH TEST OF 5%G.P &15% B.A CONCRETE OF (7, 28 DAYS):

specimen	compressive strength(7days)	compressive strength(28days)
CUBE 1	13.91	28.35
CUBE 2	21.37	28.48
CUBE 3	22.6	28.88

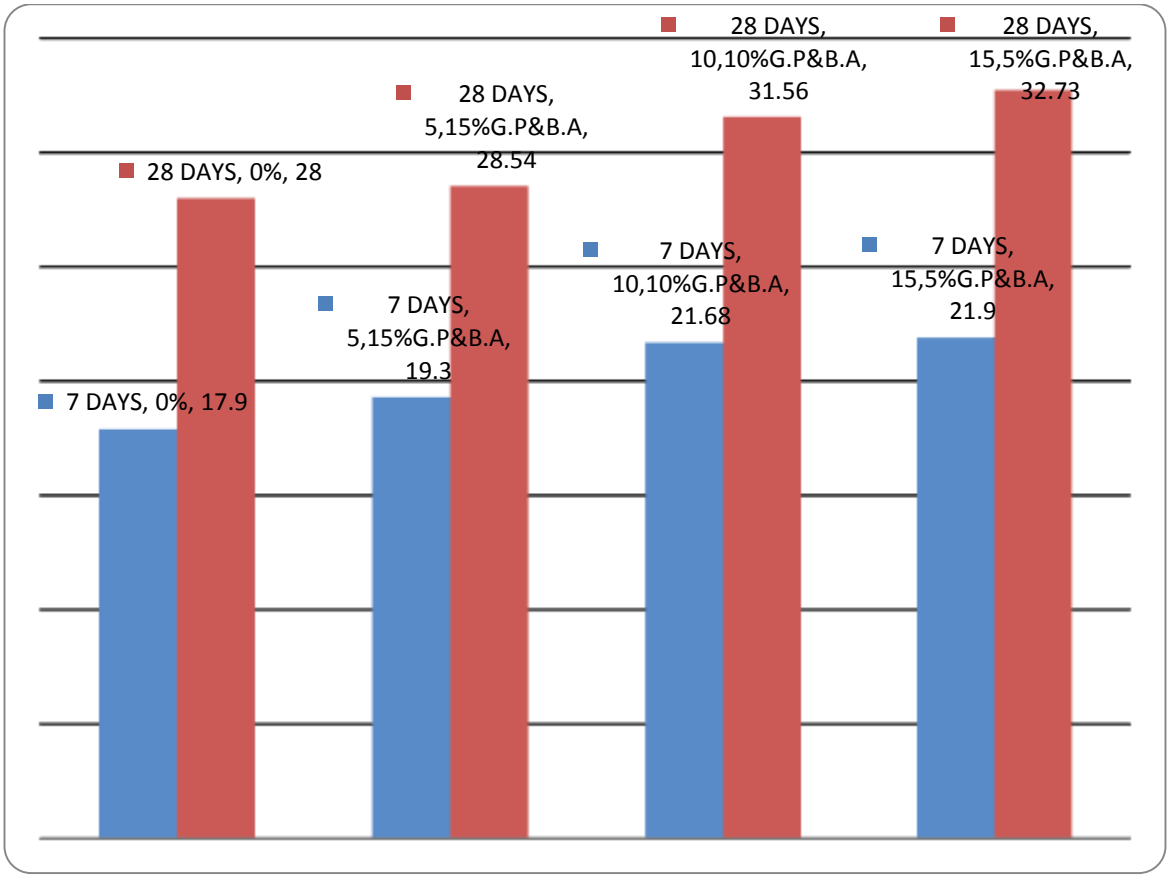
4.7. COMPRESSIVE STRENGTH TEST OF 10%G.P &10% B.A CONCRETE OF (7, 28 DAYS)

specimen	compressive strength(7days)	compressive strength(28days)
CUBE 1	16.2	32.17
CUBE 2	23.73	31.95
CUBE 3	25.11	30.57

4.8. COMPRESSIVE STRENGTH TEST OF 15%G.P &5% B.A CONCRETE OF (7, 28 DAYS)

specimen	compressive strength(7days)	compressive strength(28days)
CUBE 1	20.93	31.11
CUBE 2	21.37	34.04
CUBE 3	23.25	33.06

4.9. COMPARISION OF COMPRESSIVE STRENGTH FOR DIFFERENT PERCENTAGES OFG.P & B.A:



CONCLUSION

From the experimental study of glass powder and brick aggregate concrete the following conclusions were obtained:

- The compressive strength of the specimen of M25 ratio with the addition of glass powder and brick aggregate which has more strength when compared with the normal pervious concrete it is due to the glass powder which gives strength to it. After the adding in brick aggregate content which leads to decrease in the compressive strength because fiber is taken with the weight of cement
    - It is observed that Glass powder and Brick aggregate -based concretes have achieved an increase in strength for 15, 5% replacement of cement and coarse aggregate at the age of 28 days.
    - As increasing the brick aggregate and decreasing the glass powder the strength follows the downward series.
    - From the above experimental results, it is proved that glass powder and brick aggregate can be used as an alternative material for cement and coarse aggregate, reducing cement and coarse aggregate consumption and reducing the cost of construction. Use of industrial waste products saves the environment and conserves natural resources.

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