Reuse of Waste Demolished Concrete Aggregate and Study Its Properties

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ABSTRACT

Construction and Demolition waste constitutes one of the major components of wastes generated worldwide. Construction industry requires large amount of aggregates for concrete production. At the end of useful life of any concrete structure it is demolished. The demolished wastes is used in landfilling. On the other hand construction requires large amount of natural aggregates which is achieved by extraction and quarrying, causing depletion of natural aggregates. It is need of hour to recycle demolished construction wastes into aggregates which will reduce both the problems i.e. land filling and depletion of natural aggregates.

Keyword: - *Construction and Demolition(C&D), Recycled Aggregates, Rice Husk Ash, and Compression etc….*

1. INTRODCTION

Construction and Demolition Waste (CDW) are produced from construction, acclimation and annihilation activities. Landfill is the best and cheapest method for adjustment of C&D wastes, but due to pressure on landfill area, recycling should be main focus for the waste management. Proper administration of waste generated from construction and demolition activities may be advantageous for developing environmental condition, pollution control and activity resources.

1.1 Objective

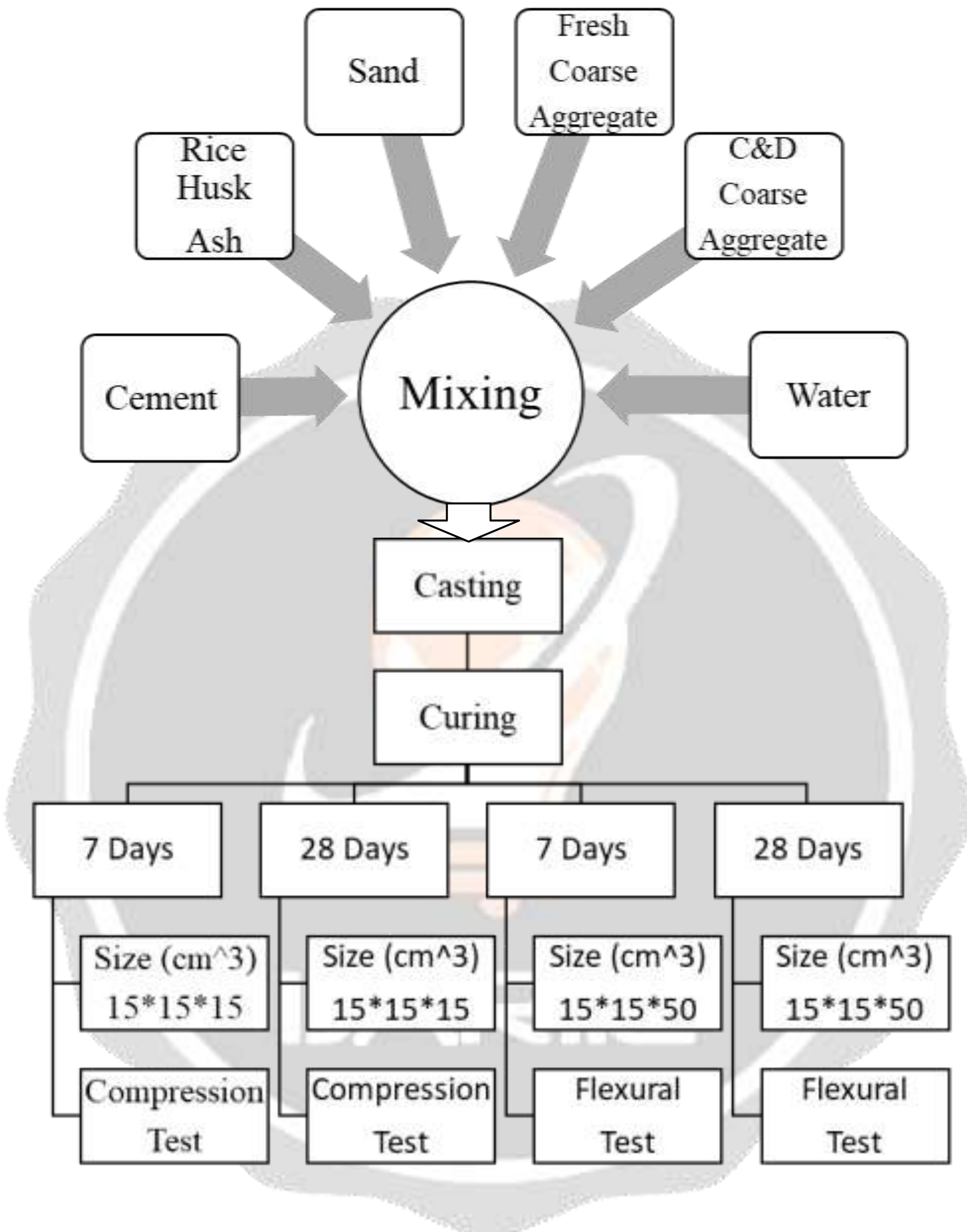
- The main objective of this project is to detail study about the waste aggregate that can be used as construction material.
- To reduce the impact of waste material on environment.
- To explore the feasibility of incorporating recycled material in new concrete.
- To make the construction cost effective by using recycled material.
- Understanding benefits and drawbacks of utilizing of recycled aggregate in comparison to others.

2. EPERIMENTAL PROCEDURE

2.1 Material

The demolished concrete material is collected from 30 years old residential demolished flat located in Ravet, pune area .The material is crushed by using Hammer at location site and sieved. After sieve analysis materials are separated and 10-12.5 mm size aggregate are considered physical properties test like impact value test , water absorption test are performed on the aggregate to check its fitness for use.

Flow chart of material composition



Replacement of Natural Coarse Aggregate by 25 %

Sr.no		M20 Mix Design			
	Content	**7 Days 15*15*15 Compression**	**28 Days 15*15*15 Compression**	**7 Days 15*15*50 Flexural**	**28 Days 15*15*50 Flexural**
1.	Cement	0.75	0.75	0.75	0.75

2.	Rice Husk Ash	0.25	0.25	0.25	0.25
3.	Sand	1.5	1.5	1.5	1.5
4.	C&D Coarse Aggregate	0.75	0.75	0.75	0.75
5.	Fresh Coarse Aggregate	2.25	2.25	2.25	2.25

Table 1.1 - Replacement of Natural Coarse Aggregate by 25 %

Replacement of Natural Coarse Aggregate by 50 %

Sr.no		**M20 Mix Design**			
	Content	**7 Days 15*15*15 Compression**	**28 Days 15*15*15 Compression**	**7 Days 15*15*50 Flexural**	**28 Days 15*15*50 Flexural**
1.	Cement	0.75	0.75	0.75	0.75
2.	Rice Husk Ash	0.25	0.25	0.25	0.25
3.	Sand	1.5	1.5	1.5	1.5
4.	Fresh Coarse Aggregate	1.5	1.5	1.5	1.5
5.	C&D Coarse Aggregate	1.5	1.5	1.5	1.5

Table 1.2 - Replacement of Natural Coarse Aggregate by 50%

3. READING TABLES

3.1 Test on Coarse Aggregates 10 - 12.5 mm down Size

Property	Natural aggregates	Recycled aggregates
Fitness modulus	6.25	5.45
Specific gravity	2.675	2.469

Bulk density	Compact state: 1.55kg/L Loose state: 1.404kg/L	Compact state: 1.44kg/L Loose state: 1.31kg/L
Crushing value	27.56%	28.1%
Impact value	21.176%	29.66%
Water absorption	0.311	2.24

Table No.3.1

3.2 Compressive Strength Results

Sr. No.	% replacement	7 days N/mm^2	28 days N/mm^2
1	0%	13.5	20
2	25%	12.40	17.70
3	50%	10.60	16.20

Table 3.2

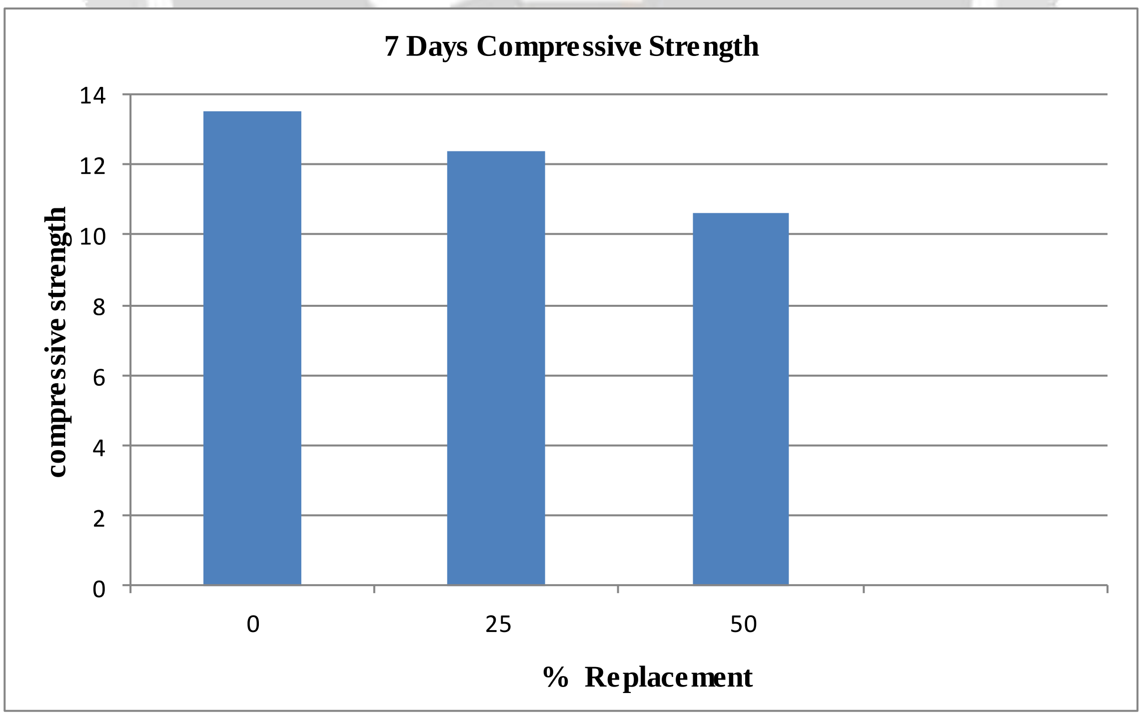


Chart 1: 7 days compressive strength

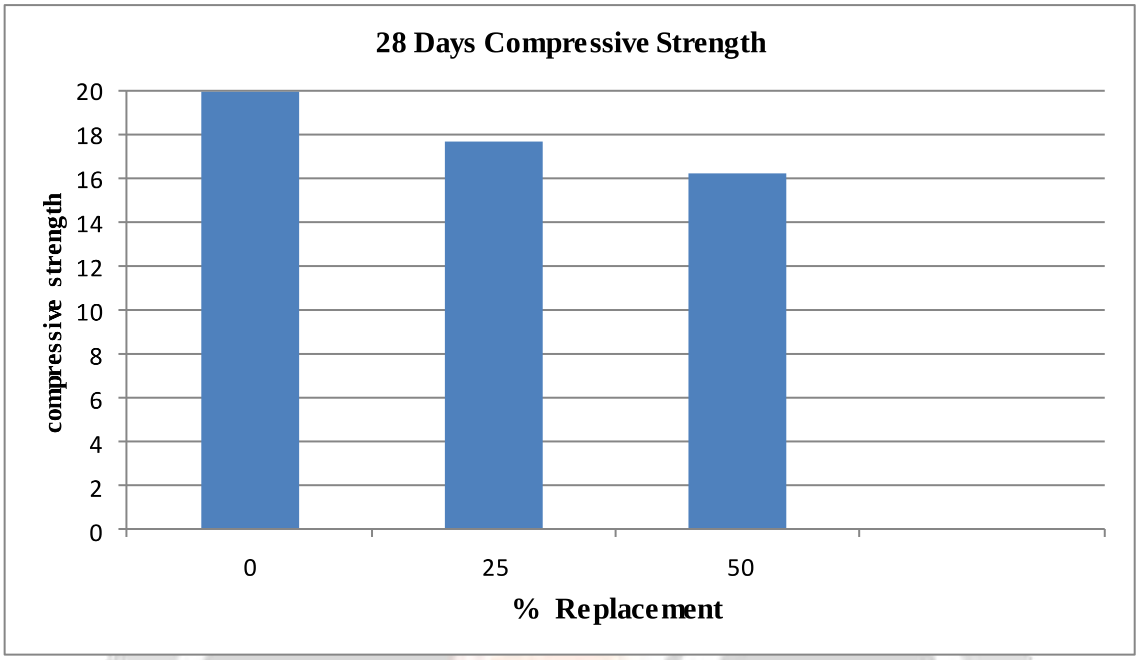


Chart 2: 28 day compressive strength

Fig 1. Compression test on specimen

3.3 Flexure Strength Results

Sr. No.	% replacement	7 days N/mm^2	28 days N/mm^2
1	0	2.32	3.51

2	25	2.08	3.02
3	50	1.77	2.58

Table No. 3.3

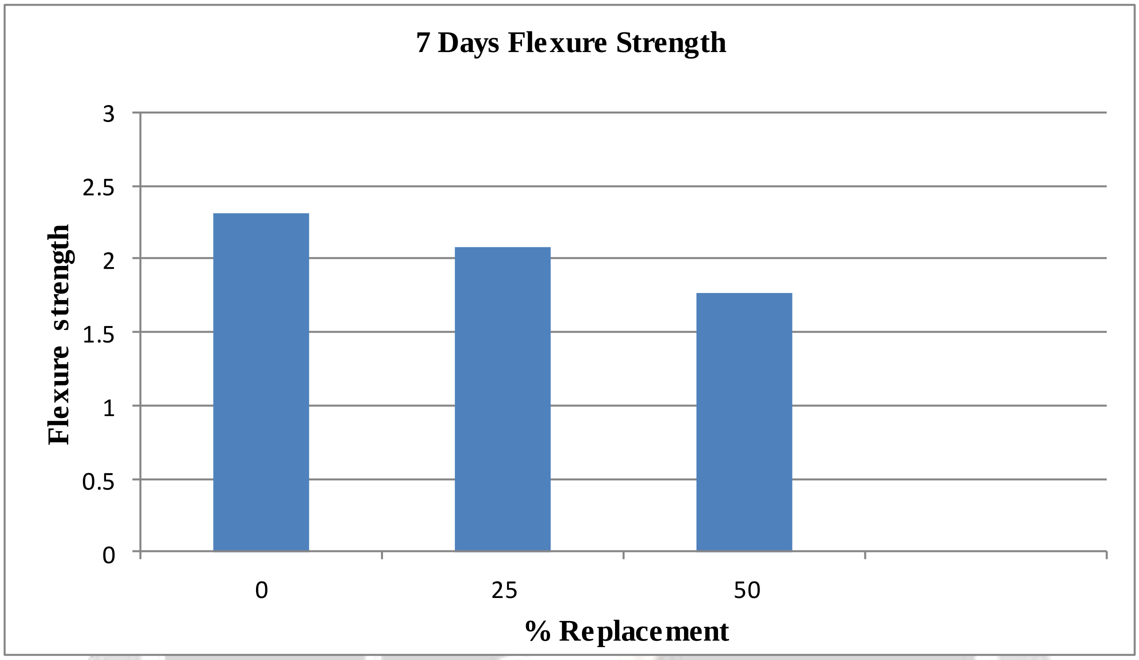


Chart 3: flexure strength result

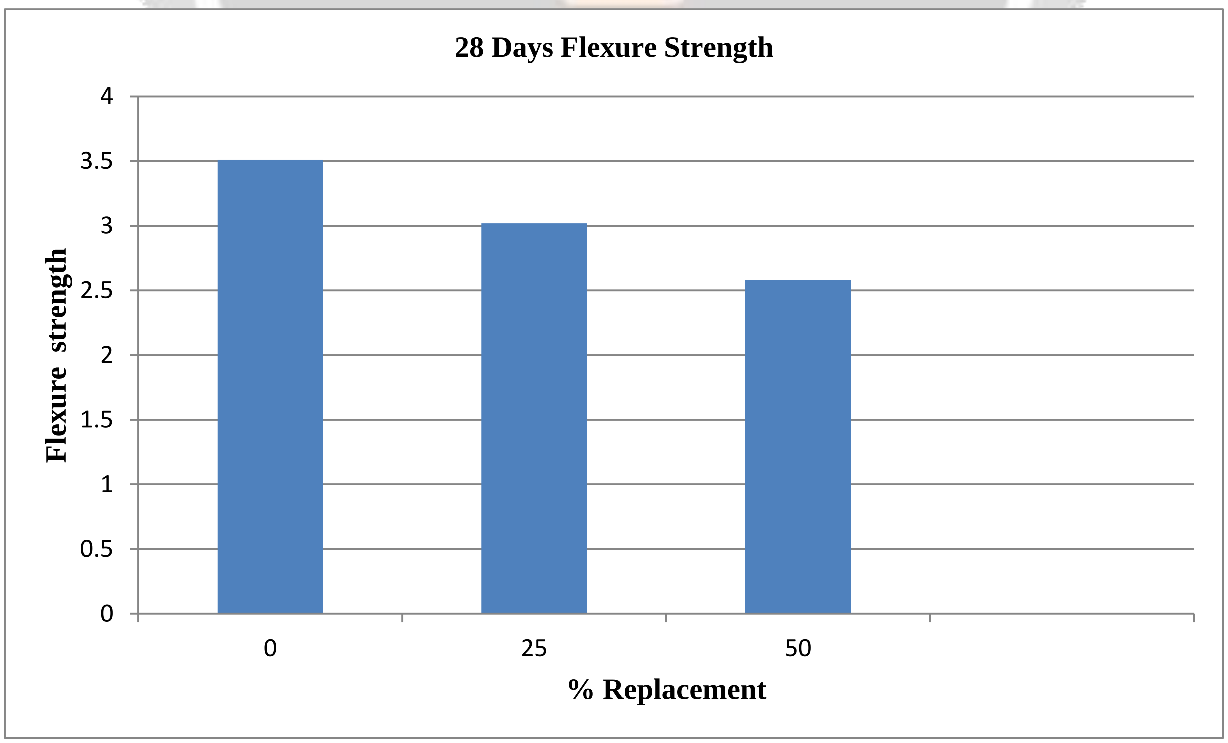


Chart 4 - flexure strength result

Fig. 2 Failure of Flexure Specimen

4. Result

Introduction From test result, it has been observed that with increase in % of replacement of natural aggregate by recycled aggregate compressive strength as well as flexural strength reduces. But from the graph it can be seen that up to 25 % replacement of natural aggregate by recycled aggregate gives optimum strength for 28 days of curing.

4.1 Abstract Sheet for Natural Aggregate:-

Sr. no.	Materials	Quantity (kg)	Rate/kg	Total Cost (Rs)
1	Cement	70.5	7	493.5
2	Sand	110.59	2.5	276.475
3	Natural Aggregate	213.7	5	1068.5
			Total	1838.475

Table 4.1

4.2 Abstract Sheet for Recycled Aggregate and Rice Husk Ash:-

Sr. no.	Materials	Quantity (kg)	Rate / kg	Total Cost (Rs)
1	Cement	53.1	7	371.7
2	Rice Husk Ash	17.70	3	53.1
3	Sand	110.59	2.5	276.475
4	Natural Aggregate	133.58	5	667.9
5	Recycled Aggregate	80.15	-	-
			Total	1369.18

Table 4.2

% Material Cost Reduction = [(1838.475 - 1369.18) / (1838.475)] * 100

= 25.53 %

4.3 Cost Analysis of Single Block of Size 15*15*15 cm

0 % Replacement of Natural Aggregate

Sr. No.	Materials	Quantity (kg)	Rate / kg	Total Cost (Rs.)
1	Cement	1.36	7	9.52
2	Sand	2.126	2.5	5.315
3	Aggregate	4.11	5	20.55
			Total	35.385

Table 4.3.1

25 % Replacement of Natural Aggregate

Sr. No.	Materials	Quantity (kg)	Rate / kg	Total Cost (Rs.)
1	Cement	1.02	7	7.14
2	Rice Husk Ash	0.34	3	1.02
3	Sand	2.126	2.5	5.315
4	Natural Aggregate	3.0825	5	15.4125
5	Recycled Aggregate	1.0275	-	-
			Total	28.8875

Table 4.3.2

50 % Replacement of Natural Aggregate

Sr. No.	Materials	Quantity (kg)	Rate / kg	Total Cost (Rs.)
1	Cement	1.02	7	7.14
2	Rice Husk Ash	0.34	3	1.02
3	Sand	2.126	2.5	5.315
4	Natural Aggregate	2.055	5	10.275
5	Recycled Aggregate	2.055	-	-
			Total	23.75

Table 4.3.3

Cost Variation with % Replacement of Natural Aggregate

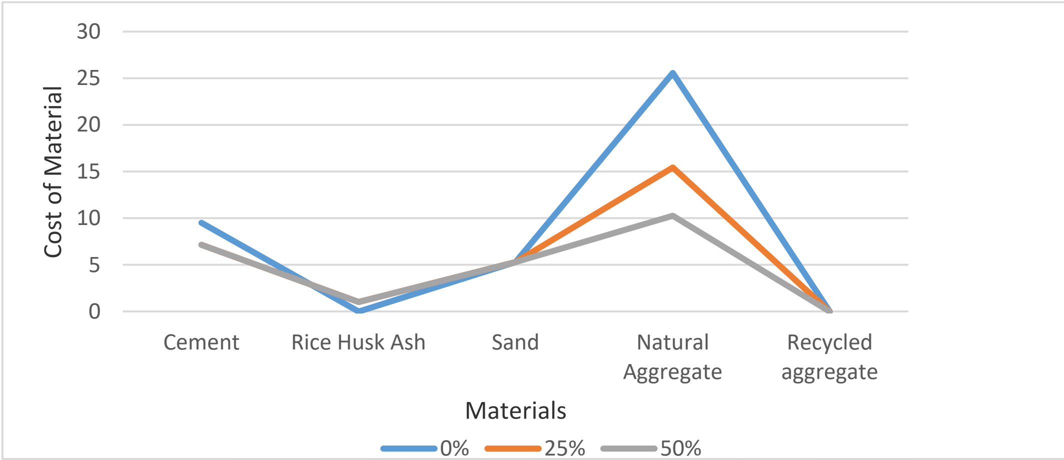
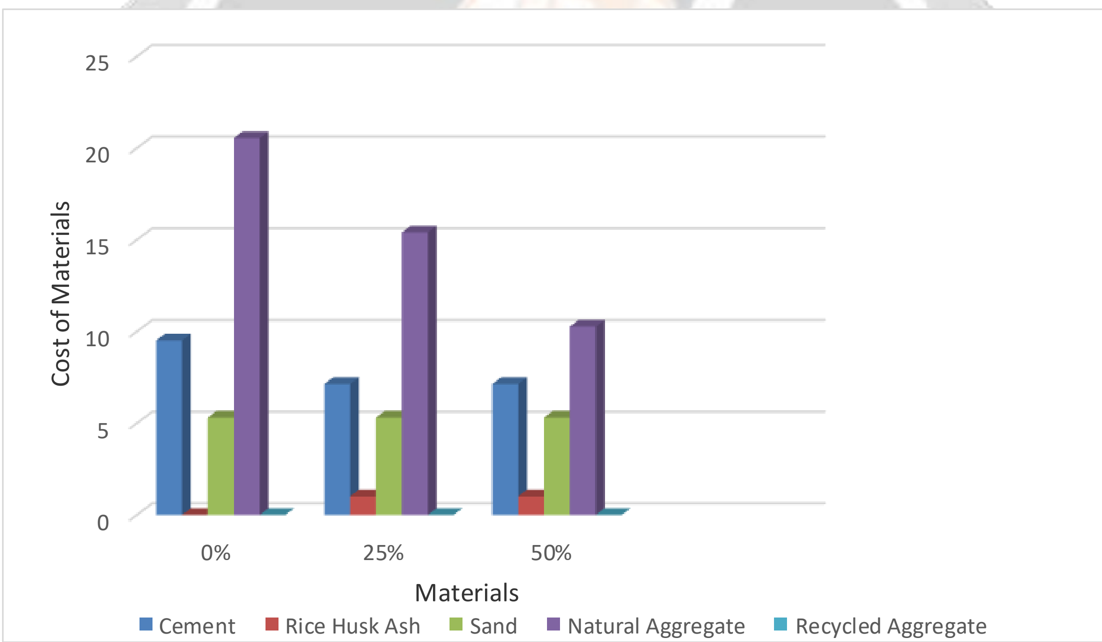


Chart 5



5. CONCLUSIONS

It is very important to do research on reuse of demolished construction waste and recycled aggregates. As the recycled aggregate can be used in place of natural aggregate up to 25 % for the optimum strength gain. Recycled aggregate are turnout to be very beneficial when it comes to lowering the cost of construction. From the research done in this project with effective use of recycled aggregate material cost can be reduced up to 25 % and it is very beneficial.

6. ACKNOWLEDGEMENT

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