

Experimental Investigation on Design and Construction of Square Deck Wall using Modern Techniques

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ABSTRACT

Today Construction industry is in need of Cost effective materials to increase the strength of concrete. The different Government and Non Governmental organizations are implementing the various cost effective materials to save and ensure the cost and quality of the structures. The various research organizations are conducting various tests on concrete with alternative materials to increase the workability. Now days it is very essential to utilize the renewable resources and realize the modern construction technologies in effective manner to reduce the cost of the construction.

According to MFE (Ministry of Forests and Environment) is stated that 15000 tons of plastic waste is generated every day, The biodegradability of the plastic is the very crucial issue and the toxic gases in the land decrease the fertility of land. The Square deck wall is new attempt in industry, waste plastics are collected and decomposed which is used in wall construction to reduce the cost.

Keyword--The Square deck wall is new attempt in industry

I. INTRODUCTION

According to the survey of central pollution control board 18th march 2016 The plastic waste generated in india is approximately 150 million tons/year. The peoples are mostly prefer plastics due to their characteristics like versatility, lightness, hardness and chemical resistance. In view of the above properties it is having more possibilities to use plastics as the alternative material in concrete batch.

Considerable researches are carried out in USA & UK on this topics, But it is an very new attempt in Indian construction industry, By using the waste plastics in Square deck wall construction reduces the construction cost. The 25 to 30% of dead load is reduced and CO2 emission is reduced

II. OBJECTIVES

The main objective of this proposal to evaluate the possibilities are listed below

- ❖ To investigate the structural behaviour of Normal concrete .
- ❖ To analyse the various alternative materials in concrete
- ❖ The proposal and investigation on structural behaviour of square deck wall
- ❖ The economic analysis and design factors for square deck wall construction

III. METHODOLOGY

- Analysis on ultimate strength of normal concrete
- Evaluation of alternate techniques for normal concrete
- Conduct various testing on alternative material
- Preparation of cost estimate for economical analysis

IV. LITERATURE REVIEW

1.Simulation of low cost Green building construction technologies

Velumani P

International Journal of Management, Information Technology and Engineering (BEST:IJMITE) Vol.1 , Issue 3, Dec 2013, 105-116

STUDY

The study explains the Reduce the resources like renewable and non-renewable, reuse the items as much as possible, existing components are put to some new purpose (recycle). Rethink about the impact of environment before using the resources; Recover the waste products to use. The experiment showed a promising result where by the indoor temperature dropped down 6°C to 10°C with green building

technologies. As a result, provides solutions to environmental problems and contributes in keeping the environment clean and green. It aims that green buildings are only way to a sustainable future mitigate.

2. Waste Plastic Bottle offering innovative building materials with sustainable application.

Dr,Pratima Patel, Akash Shah, Henish Patel

International journal of innovative and emerging research in engineering e-ISSN : 2394 – 3343

STUDY

The study involves application of plastic bottle as one of urban wastage in building construction and how it can lead to sustainable development. The paper includes different factors such as time of execution, cost , load capacity, flexibility, reducing waste and energy efficiency, plastic bottle may be more effective compared to some conventional building materials such as bricks and concrete block.

3. Government's Role in extension of Cost Effective and Alternate Building Technologies

Suvarna. S. Lele,

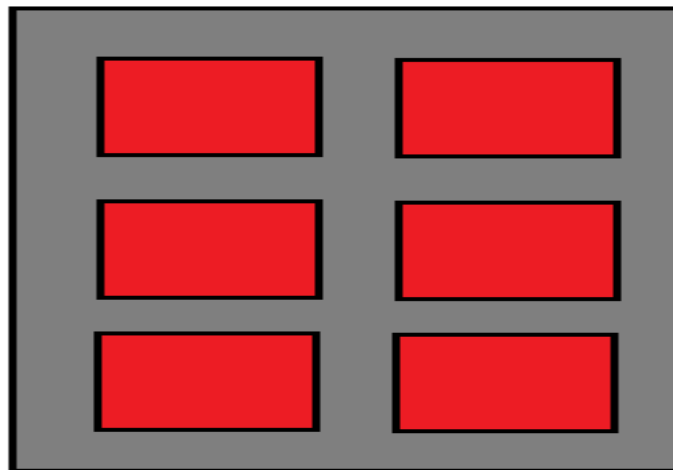
International Journal of Earth Sciences and Engineering ISSN 0974-5904, Volume 04, No 06 SPL, October 2011, pp. 756-759

STUDY

This paper is an overview of Governments role in propagating the different types of Cost Effective technologies on several Government and local levels through various organizations. The availability of alternate technologies and materials which are much cheaper, there is a need of transferring them to needy to build low cost houses.

V. SQUARE DECK WALL CONSTRUCTION

- The plastic bricks replace the space occupied by the concrete.
- This replacement reduces the dead weight of the building.
- The voids present inside the plastic bricks helps to resist the fire.
- It is very helpful to pre-fabricated construction (transportation , lifting and placing)



GRAPHICAL MODEL OF SQUARE DECK WALL

VI. EXPERIMENTAL STUDY ON SQUARE DECK WALL

The Experiment was conducted on modified cubes to analyse the ultimate strength and durability of the concrete.



Fig No : 1 Sustainable material of various sizes used for casting

Type	volume (cm3)	Weight (gms)	Height (mm)	Remarks
1	320	22	64	
2	510	36	81	
3	1000	34	102	
4	729	34	92	

Table : 2 Various type of Boxes



Fig No: 2 Casting of Cubes

VII. EXPERIMENTAL RESULT



Fig 3: Testing of Cubes (boxes are 100% reusable)

M 20				
TYPE OF CUBES	Average Weight of cubes (Gms)	Load (Kn)	Compression Strength (N/mm ²)	Remarks
NORMAL	8620	580	25.78	PASS
	8620	560	24.89	
TYPE 1	7760	510	22.67	PASS
	7740	500	22.22	
TYPE 2	7600	470	20.89	PASS
	7610	480	21.33	
TYPE 3	7280	300	13.33	-
	7310	280	12.44	
TYPE 4	7300	450	20.00	PASS
	7310	460	20.44	

Table: 3 Test Results of M20 Modified cubes

M 15				
TYPE OF CUBES	Average Weight of cubes (Gms)	Load (Kn)	Compression Strength (N/mm ²)	Remarks
NORMAL	8850	480	21.33	PASS
	8710	490	21.78	
TYPE 1	7740	450	20.00	PASS
	7780	430	19.11	
TYPE 2	7620	400	17.78	PASS
	7590	390	17.33	
TYPE 3	7360	280	12.44	-
	7310	270	12.00	
TYPE 4	7290	360	16.00	PASS
	7320	370	16.44	

Table : 4 Test Results of M15 Modified cubes

VIII. COST ANALYSIS

Description	M15	M 20
Concrete		
Cement	1,480.00	1,650.00
Aggregate	1,230.00	1,200.00
Sand	1,010.00	1,002.00
Micro Silica		
Flyash	-	-
Admixture	-	-
Sampling, Yield loss & Wastage @ 1.5%	88.95	88.95
Batching Plant cost	986.00	986.00
Total Cost of Normal Concrete (Per Cum)	4,795	4,927
Cost Of the Modified cubes (Per Cum)	3,356	3,449
Bricks		
Cost Of the Brick wall (Per Cum)	5000	

Table: 5

IX. RESULT AND CONCLUSION

- 1) The Modified concrete cubes M15 & M20 grade was casted, cured and tested to achieve the required strength on 28 days.
- 2) The tested cubes achieved the maximum target strength.
- 3) As Per the comparison 20 % to 30 % of volume decreased in Modified cubes.
- 4) Nearly 25 % of cost reduced on modified cubes and most economical as compared to the normal brick masonry..

The behavior of building frame with and without floating column is studied under static load, free vibration and forced vibration condition.

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