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Rapid housing by using GFRG panels

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SEMINAR REPORT
ON
“RAPID HOUSING BY USING GFRG PANELS”

SUBMITTED

BY

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Under the Guidance of

Prof. ANIRUDDH DUBAL

In fulfillment of

B.Tech in Construction Engineering & Infrastructure Management

Symbiosis Skills & Professional University, Kiwale, Pune

2020-21



Department of Construction Engineering

SSPU - Kiwale, Adjoining Mumbai – Pune Expressway, Pune- 412101,

Academic Year 2020-2021



DEPARTMENT OF CONSTRUCTION ENGINEERING

CERTIFICATE

This is to certify that

Mr. SHREYAS SHRIDHAR GALAGALI

has satisfactorily and successfully

completed A Dissertation work on

“RAPID HOUSING BY USING GFRG PANELS”

In fulfillment of Bachelor’s degree in

B.Tech in Construction Engineering and Infrastructure Management

**From the Symbiosis Skills and Professional University, Pune during the
academic year 2020-21**

Prof. Aniruddh Dubal

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Examination Approval Sheet

The Dissertation report entitled

“RAPID HOUSING BY USING GFRG PANELS”

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Academic Year 2020-2021

Examiners:

External Examiner:-.....

Internal Examiner:-.....

Date:.....

Place:.....

DECLARATION

I declare that this written submission represents my ideas in my own words and where other's ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will cause for disciplinary action by the university and can also evoke penal action from the sources which have not been properly cited or from whom proper permission has not been taken when needed.

SHREYAS SHRIDHAR GALAGALI

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ABSTRACT

Glass Fiber Reinforced Gypsum (Gfrg) Wall Panel Is Made Essentially Of Gypsum Plaster Reinforced With Glass Fiber. The Panels Are Hollow, In Conventional Building Brick Work Is Can Be Used To Load Bearing Walls And Gfrg Panels Can Be Used As Load Bearing Walls.They Are Light In Weight And Overall Cost Is Also Low As They Are Made From Recycled Industrial Waste Gypsum Which Is Obtained As Byproduct From Various Fertilizer Industries, Chopped Fibres Are The Main Filler Material Used Which Act As Reinforcement Instead Of Concrete To Reduce The Weight Of Brick.The Results Showed Promise, That The Gfrg Brick Was Efficient Than The Clay Brick.The Idea Of This Paper Is To Find A Use For This Waste Gypsum Into Something Useful

Keywords - Gypsum, Glass Fibre, Reinforcement, Affordable, Mass Housing

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Lastly I express my heart full thanks to all my colleagues and all those who have directly or indirectly involved my project and supported me to complete this seminar successfully.

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CHAPTER 1

INTRODUCTION

1.1 Background

GFRG / Rapid Wall Is Load Bearing Pre-fabricated Walling Panel. This Is Suitable For Rapid Mass Scale Building Construction Was Originally Developed And Used Since 1990 In Australia. Professors From Iit Madras Have Extensively Researched And Found Out This Can Be Used For Other Structural Elements Like Slab, Roof, Staircase Etc. GFRG Panel Is Manufactured Using Gypsum As A Core Material, Which Is Generated As A By Product In The Process Of Manufacturing Fertilizers. GFRG Panels Is Manufactured At Rcf Mumbai And Fact Kochi. GFRG Panel Is Suitable For Load Bearing Applications And As Hybrid Construction In Multi-storey Buildings.

1.2 Aim: To Understand The Concept Of Rapid Housing Using GFRG Panels

1.3 Objectives

1. To understand the concept.
2. To understand the construction procedure of GFRG panels.
3. To understand manufacturing process.
4. To compare rapid housing with conventional method

CHAPTER 2

LITERATURE REVIEW

(1) NAME OF AUTHOR

Sk.Subhan Alisha, Sajja. Neeraja, Sk. Akber, G.Sai Manoj,

TITLE OF PAPER

Low Cost Housing by Using GFRG Panels.

REMARK

In this paper we have learnt about GFRG panel details, properties and tests on the GFRG panels. We have learnt about the step by step procedure of a GFRG panel construction. Research has found gypsum to be a durable material, and it is already heavily in use as partition walls. Experts predict that a building made of GFRG panels can have a life span of 60 years. A GFRG building does not require beams and columns. The panel cavities can be partially or fully filled with reinforced concrete to provide additional strength. Buildings with load-bearing systems made of reinforced GFRG panels can go as high as 8-10 Storey's in low seismic zones. The panel cavities can also be used for electrical wiring and piping work.

2) NAME OF AUTHOR

Randhir J. Phalke¹, Darshan G. Gaidhankar

TITLE OF PAPER

Flexural Behaviour Of Ferrocement Slab Panels

REMARK

Steel fibers result shows that incorporation of steel fibers long with increment in number of layers leads to 58% increase in load carrying capacity and 33% decrease in deflection. The present study describes the results of testing flat ferrocement panels reinforced with different number of wire mesh layers. The main objective of this work is to study the effect of using different no of wire mesh layers on the flexural strength of flat ferrocement panels and to compare the effect of varying the no of wire mesh layers and use of steel fibers on the ultimate strength and ductility of ferrocement slab panels. The no of layers used are two, three and four. Slab panels of size (550*200) with thickness 25 mm are reinforced with welded square mesh with varying no of layers of mesh.

CHAPTER 3.

METHODOLOGY

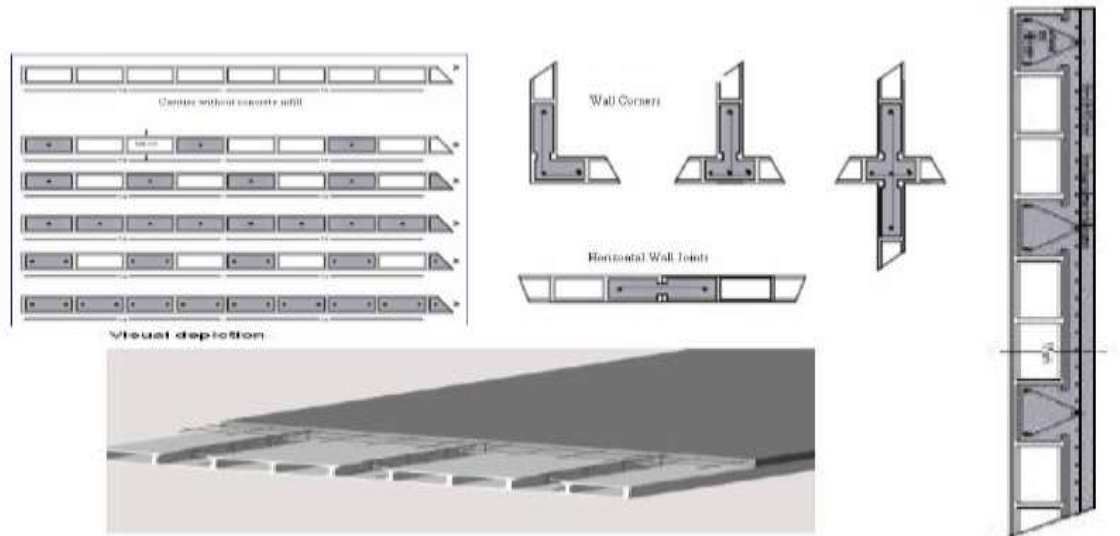
3.1 TRANSPORTATION AND LIFTING

- Panels are vertically loaded at the factory on stillages for transport to the construction sites on trucks.
- The stillages are placed at the construction site close to the foundation for erection using vehicle mounted crane or other type of crane with required length for construction of low, medium and high rise buildings.
- Special lifting jaws suitable to lift the panel ,are used by inserting into the cavities and pierced into webs, so that lifting/handling of panels will be safe.



3.2 JOINTS AND CAVITIES

Wall to wall 'L', 'T', '+' angle joints and horizontal wall joints are made by cutting of inner or outer flanges or web appropriately and infill of concrete with vertical reinforcement.



CHAPTER 4

. MANUFACTURING PROCESS

- This area consists of 6 casting tables having dimensions of 3m x12m, one crab having mixer and glass roving delivery system is for delivering slurry and glass roving .
- The chemicals are added in water & mixed and then plaster is added & mixed to form slurry.
- One layer of slurry is laid on the table by the crab followed by a layer of glass roving.
- Finally a layer of glass roving is laid for the top face of the wall panel.



CHAPTER 5.

ADVANTAGES & DISADVANTAGES

ADVANTAGES

- (a) High speed of construction.
- (b) Less built-up area for the same carpet area.
- (c) Recycling of industrial waste gypsum results in less embodied energy and carbon footprint.
- (d) Significant reduction in the use of cement, sand, steel and water.
- (e) Excellent finishes of prefabricated GFRG panels for all the walls, floors and staircases, eliminating the need for additional plastering.
- (f) Lower cost of structure due to savings in materials.
- (g) Less energy consumption for heat-regulation of interior of buildings.
- (h) Less CO₂ emission, compared to other conventional building materials.

DISADVANTAGES

- (a) During the construction process, more space is required for the crane to move.
- (b) To install the GFRG panels, highly qualified and experienced labor is required.
- (c) Cutting GFRG panels on-site requires specific machines.

CHAPTER 6

CONCLUSION

- GFRG Panel Provides A New Method Of Building Construction In Fast Track.
- By This Process, Manpower, Cost, And Time Of Construction Can Be Reduced.
- The Use Of Scarce Natural Resources Like River Sand, Water And Agricultural Land Can Be Significantly Reduced.
- We Can Save Our Environment By Reducing Co2 Production In Conventional Construction Method.
- And The Most Important, This New Technology Is Having Potential To Provide Shelter To The Homeless Families.

CHAPTER 7

REFERENCES

- Low Cost Housing By Using GFRG Panels By Sk.Subhan Alisha, Sajja. Neeraja, Sk. Akber, G.Sai Manoj,
- Flexural Behaviour Of Ferrocement Slab Panels by Randhir J. Phalke¹, Darshan G. Gaidhankar