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Construction of Prefabrication Houses using Fiber Cement Boards (V Boards)

Landslide and Flood Revival Prefabrication Houses in Kerala

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***Abstract*— Flooding and flood risk have been important considerations for a long time. This has been emphasized by flooding in recent year in *Kerala*. A flooding analysis in engineering can take many forms and include: State or location specific flood risk management plans, Catchment flood risk management plans, Overland flow assessment and Creek and river flood analysis.**

Kerala, a state in India recently devastated by serve monsoon rains. They found a vulnerable population that will soon face fresh landslide risks as a new monsoon approaches. Since the onset of south-west monsoon on May 29, *Wayanad* district in *Kerala* has experienced 247 landslides. So we choose a village called *Panamaram* in *Wayanad* district, where we carried out our revival tasks. In order to complete the project in time we selected fiber cement board as the principle building material. We have opted the idea of prefabrication structures for fast construction.

In fiber cement there is fiber reinforcement with cement, which contributes to making the fiber-cement material even stronger. Together with a carefully planned production process, fiber cement makes it possible to develop strong and long lasting construction materials. The fiber cement board also called as v board, is cost effective and time saving solution for construction of dry wails. V panel has all the advantages of masonry wall with added qualities for preferred construction. V panel is a user-friendly product for installation and proves to be a better substitute for conventional walls and any other dry walls solutions. V-Boards are eco-friendly which make the pre-fabricated structures safe and comfortable to live and provide conducive working ambience and are ideal for use in residential constructions like rooftop extensions, storage rooms, sentry post, cottages, farm house, site-offices. Commercial applications include offices, labors quarters, transit camps rehabilitation centers, schools, health care centers, kiosks, etc.

Keywords:- Fiber cement board; flood revival; prefabrication house;construction ; landslide

I. INTRODUCTION

In the month of August 2018, the state of *Kerala* in *India* received a very heavy rainfall, which led to unprecedented flooding throughout the state. As of mid-August, a total of 2,346.3 mm of rainfall had fallen on Kerala instead of an average of 1649.55mm. floods and landslides, brought *Kerala* to a standstill during most of the month of August.

The impact on Kerala's population was significant. In total it is estimated that 23 million people were affected. It was reported that 504 people died, and 3.4 million people were hosted in 12,300 emergency shelters and relief camps at some point.

As mentioned earlier, the selected plot is situated at *Panamaram*, which is a place in *Wayanad* district. There were many families who lost their shelter due to the series of landslides. We interrogated about their problems by visiting them in relief centers. Our aim was to handover the houses, with adequate facilities, as quickly as possible. We considered time of completion is the most important factor for this task.

A. Objectives

1. Provide shelter for the victims.
2. Help to get them back to the normal life.
3. Interrogate their problems and find solutions.
4. Provide adequate facilities considering their needs.
5. Inclusion of maximum number of families to the revival project.

B. Material Selection

Since time is the most important factor, construction procedure has a big role while preparing the project schedule. In order to make the construction procedure much easier selection of building material has a vital role. So we have to consider that the list of factors that affect the material selection.

C. Factors considered for the selection of materials

1. Economic Factors
2. Mechanical and Non-Mechanical properties
3. Production/Construction Considerations
4. Aesthetic Considerations
5. Strength
6. Availability
7. Durability
8. Workability
9. Ease of Transportation
10. Cost
11. Resistance to Fire
12. Sound Resistance
13. Physical Properties
14. Resistance to Air and Water penetration
15. Resistance to crowd pressure
16. Dismantlement

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D. Fiber cement board

Fiber cement boards are manufactured from special grade cellulose fiber and inorganic binders of silica base. The matrix made to the required thickness is cured at high temperature and high pressure in autoclaves to attain crystalline structure which imparts dimensional stability to the fiber cement board. The cement component makes it durable & the cellulose component makes it more workable.

Fiber cement board is cost affective and time saving solution for construction of dry walls. Fiber cement panel has all the advantages of masonry wall with added qualities preferred for construction. Fiber cement panel is user-friendly product for installation and proves to be a better substitute for conventional walls and any other dry wall solutions. It is manufactured using a unique technique.

The unique semi-circular tongue and groove makes installation of fiber cement panel very easy.

It is considered the longest, lightest and strongest of all the dry elements.

It is an energy efficient building product because of its excellent thermal properties.

E. Why Fiber Cement Board?

1. Economic Factors

- Fiber cement board is an economically fit option since it offers good workability, ease in finishing and minimum overall cost.
- Overall cost include painting, furnishing, plastering etc.

2. Mechanical and Non-Mechanical Properties

- Brittleness
- Stiffness
- Hardness
- Toughness
- Homogeneity

Fiber cement board shows excellent performance in all the listed above properties

3. Product/Construction Considerations

- Large scale production is possible
- Faster rate of production
- Raw materials are available in ease

4. Aesthetic Consideration

- Good results in aesthetic appearance

5. Strength

- Axial load/KN meter = 92

6. Availability

- Raw materials are:
  - •Cement
  - •Fly ash
  - •Expanded polystyrene beads
  - •Cellular pulp
  - •Quartz

7. Durability

- Durability is same as that of conventional house construction

8. Workability

- Easy cutting
- Easy insertion
- Zero void space that too without a binding material
- Easy alignment
- Easy demolition

9. Ease of transportation

- Transportation cost is lesser than that of conventional method
- Construction area completion per delivery is greater(This include masonry, plastering,..etc)

10. Cost

Cost of the materials used is listed out in table 1

Table 1.Cost of materials

Fiber cement board for flooring	23400.00
Partition wall (Fiber cement panel 3rd exterior and 2nd interior)	93700.00
Joinery (UPVC and Aluminum Fabrication)	39000.00
Roofing(Tile)	26500.00
Ceiling(Fiber cement board)	7500.00

11. Resistance to Fire

- The data of evolution reveals that the fiber cement board partition specimen resisted 83 minutes with respect to thermal insulation
- Test result of 1 hour and 2 hour methods are given below

12. Sound Resistance

- Successfully passed the acoustic test, the volume of source room was 257 meter cube and that of receiver room was 271 meter cube.

13. Physical properties

- Thickness:4cm(core material)
- Density:315 kg/meter cube
- Moisture Content:4.9%

14. Resistance to Air and Water Penetration

Inference of the test:

- Dampness - No Dampness
- Increase in weight - 4.28%
- Leakage – No Leakage

15. Resistance to Crowd Pressure

- The test was success since no collapse is observed

16. Dismantlement

- The whole setup can be dismantled and assembled very easily

F. Adventages of Fiber Cement Board

- Water resistant
- Termite resistant
- Light Weight
- Time saving
- Space saving
- Easy work ability
- Ease to dismantle and relocate
- Thermal insulation
- Sound insulation
- High strength
- Eco friendly

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CONCLUSION

When The Factors considered for the selection of materials is compared with those characteristics of fiber cement board. This study proves that Fiber cement board is the most suitable building material in our case.

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