



Cost Effective House by Using Various Construction Techniques and Materials

KEYWORDS

LOW COST HOUSES (LCH) MEASUREMENT SHEET (MS), SUSTAINABLE DEVELOPMENT (SD)

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ABSTRACT

Low cost housing technologies aim to cut down construction cost by using alternatives to conventional methods and Input. "It is effective budgeting and technique which help in reducing cost of construction through use locally available material along with improve skills and technology without sacrificing the strength, performance and life of structure. "Low cost housing merely satisfies the most bottom and fundamental human needs for shelter and neglects other needs that people aspire home including psychological, social, and aesthetic needs and ultimately, need for self actualization. This paper examined the cost effectiveness of using low cost housing technologies in comparison with the traditional construction methods. Two case studies in India were conducted. It was found that about 26.11% and 22.68% of the construction cost, including material and labor cost, can be saved by using the low cost housing technologies in comparison with traditional construction methods for walling and roofing respectively.

1) INTRODUCTION

India is the developing country having only 20% population of higher income group. Adequate shelter for the reduction in cost is achieved through effective utilization of locally available material and techniques. The material and techniques should be durable, economical, accepted by users and not requiring costly maintenance. Economy is also achieved by postponing finishing and implementing low cost housing technology in phase's. High efficiency of workers, minimizes waste in design. Studies assessing the conditions of low cost housings have mostly focused on satisfaction levels and subjective perception of quality particularly with regard to the dwelling units or the larger neighborhood characteristics. However, residents usually react upon their immediate environment to achieve satisfaction and make the surrounding area as their home's and apply good management practices can also be achieved. For all people is one of the challenges faced by developing countries. Housing is a basic need. Adequate shelter for all people is one of the challenges faced by developing countries. India is currently facing shortage of about 17.6 million houses

Low cost housing can be considered affordable for low and moderate income earner if household can acquire a housing unit for an amount up to 30% of its household income. The low income group in developing country are generally unable to access the housing market. As the three basic needs of people are food, clothes and shelter so main objective is to provide one of the basic need i.e. shelter to low income earners. Low cost housing is a relative concept and has more to do with budgeting and seeks to reduce construction cost through better management, appropriate use of local materials, skills and technology without sacrificing strength and life of structure. All need where families can have a comfortable living and work in a sustainable environment.

Pune is the second largest city in Maharashtra and 8th in country. As per the Census 2001 the population of the city is 2.7 million. The reported average population density as per the 2001 census was 11500 persons per Sq. Km. However the city's urban body, Pune Municipal Corporation (PMC), estimated the population to have grown to about 3 million in the year 2006, with the population density of 13200 persons per Sq. Km. This effectively means a phenomenal increase of 11% in terms of population in 5 years.

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I. METHODOLOGY

This study is based on literature and field survey.

The focus of the study is to find out issues resulted from low cost house extension projects that affect the construction activities.

The field study is divided into three parts –

On site observation on construction activities to investigate and examine construction activities carried out by the contractors.

Finding new construction techniques to implement them in construction of building.

Study of low cost construction materials from projects under construction and recently completed.

After completion of these processes, site observations will be carried out to gather primary data.

This data will help to determine the research basis and direction. Reviews of other works from literature survey will become the backbone of this research.

Comparison of low cost building with conventional building.

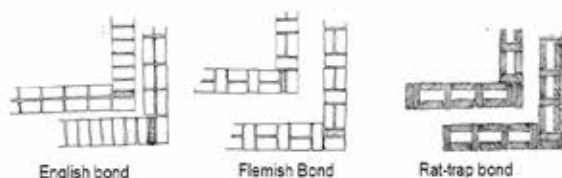
II. CONSTRUCTION TECHNIQUES FOR LOW COST HOUSING

- 1) Rat-trap Bond Technology.
- 2) Filler Slab Technology
- 3) Aluform Technology
- 4) Gypsum Area Separation Wall

1. Rat-trap Bond Technology-

The rat trap bond is a masonry technique, where the bricks are used in a way which creates a cavity within the wall, while maintaining the same wall thickness as for a conventional brick masonry wall. While in a conventional English bond or Flemish bond, bricks are laid flat, in a Rat trap bond, they are placed on edge forming the inner and outer face of the wall, with cross bricks bridging the two faces.

The main advantage of Rat-trap bond is reduction in the number of bricks and mortar required as compared to English/ Flemish bond because of the cavity formed in the wall.

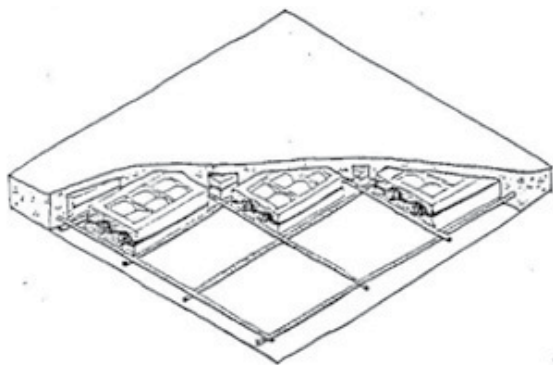


2. Filler Slab Technology-

Filler slab is a variation of conventional reinforced cement concrete slab in which part of the concrete is replaced with a filler material which can be a waste material to ensure economical advantage over an RCC slab.

The basic principle in a filler slab is that, considering an RCC slab of a given thickness, the concrete in the bottom half of the slab is simply dead weight and does not play a role in taking up compressive load, which is normally taken up by concrete in an RCC slab. So, this concrete can be replaced by a suitable lightweight filler material which can be accommodated in the bottom half of the slab.

The design of the filler slab is based on the same procedures which are adopted for design of conventional reinforced concrete slabs. The underlying principle of the filler slab is that for roofs which are simply supported, the upper part of the slab – above the neutral axis - is subjected to compressive forces and the lower part of the slab experience tensile forces



3. Aluform Technology-

Mivan is an aluminum formwork system developed by one of the construction company from Europe. Mivan is an upcoming technology which has empowered and motivated the mass construction projects throughout the world.

The technology has been used extensively in other countries such as Europe, Gulf Countries, Asia and all other parts of the world.

Wall Panel: - It forms the face of the wall. It is an Aluminum sheet properly cut to fit the exact size of the wall.

4. Gypsum Area Separation Wall-

Gypsum panel products shall not be used where there will be direct exposure to water or continuous high humidity conditions. Such areas include but are not limited to saunas, steam

rooms, gang shower rooms, and indoor pools.

Gypsum panel products shall not be used where they will be exposed to sustained temperatures of more than 125°F (52°C) for extended periods of time.

In single layer gypsum panel product systems, end joints parallel to and on the same side of framing members shall be staggered between alternate courses of gypsum panel products and from joints on the opposite side of the framing.



IV. LOW COST MATERIALS

| Sr.No. | PARAMETERS | DESCRIPTION |
|--------|--------------------------|---------------------------|
| 1) | Concrete | M20 + Fly Ash (25%) |
| 2) | Sand | Natural Sand < Crush Sand |
| 3) | Aggregate | Light weight aggregate |
| 4) | Plaster - Internal | Gypsum |
| | External | Crush Sand |
| 5) | Tiles | Ceramic Tiles |
| 6) | Flooring | Verified Flooring |
| 7) | Doors | Teak Wood |
| 8) | Windows | M. S. Fabrication |
| 9) | Drainage Pipe | R.C.C. |
| 10) | Partition Wall Thickness | 150MM |
| 11) | Slab Thickness | 130 MM |
| 12) | Paint | OBD / Dry Disemper |

RESULTS-

1. for conventional building total cost (for 1m³) **150728 Rs.**

2. for low cost building total cost (for 1 m³) **103822 Rs.**

Conclusion

As explained by using various alternative materials cost of Construction will reduce up to 19%. By using various technologies as explained the cost reduction is up to 20 to 30 %. People will get all primary and basic services at their affordable price. Congestion will be reducing.

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