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STUDY AND ANALYSIS OF LOW COST HOUSING

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Abstract

The basic principle behind this paper is to reduce the cost of project by reducing duration of project and using different techniques which helps to reduce cost of project without losing quality. Time material used and techniques are the three factors which affects the cost of housing or construction. Currently India is facing a shortage of about 17.6 million houses. It has become a necessity to adopt cost effective, innovative and eco-friendly housing technologies for the construction of houses and buildings for enabling the common people to construct houses at affordable cost. This paper compares construction cost for the traditional and affordable housing technologies. Case studies in India are used for investigation. Construction methods of foundation, walling, roofing and lintel, doors and windows are compared. Strength and durability of the structure, stability, safety and mental satisfaction and other factors are assume to be top priority during cost minimization.

INDEX TERM: Low housing technology, Effectiveness, Cost, Construction.

1. INTRODUCTION

Low cost housing is the concept dealing with construction of houses in budgeting and seeks to reduce construction cost through better management, appropriate use of local materials, skills and technology but without sacrificing the performance and structure life. Low cost housing can be considered affordable for low- and moderate-income earners if household can acquire a housing unit (owned or rented) for an amount up to 30 percent of its household income. In developing countries such as India, only 20% of the population are high-income earners, who are able to afford normal housing units. The low-income groups in developing countries are generally unable to access the housing market. A low cost house is designed and constructed as any other house with regard to foundation, structure and strength. The reduction in cost is achieved through effective utilization of locally available building materials and techniques that are durable, economical, accepted by users and not requiring costly maintenance Economy is also gain by postponing, finishing and implementing low cost housing technologies in phases. High efficiency of workers, minimize waste in design and apply good management practices, can also be achieved. Low cost housing is a new concept which deals with effective budgeting and following of techniques which help reducing construction cost through the use of locally available materials along with improved skills and technologies without sacrificing the durability, strength, performance of the structure. Low cost housing technologies aim to decrease the construction cost by using alternatives to the conventional methods and inputs. It is about the usage of local and indigenous building materials, local skills, energy saver and eco-friendly options.

2. Low Cost Housing Technology

2.1 Foundation:-

The lowest artificially prepared pairs of the structures which are in direct contact with the ground and which transmit the loads of the structures to the ground are known as foundations or substructures. Normally the foundation cost comes to about 10% to 15% of the total building and usually foundation depth of 3 to 4 ft. is adopted for single or double store building and also the concrete bed of 6″ (15 Cm) is used for the foundation which could be avoided.

It is recommended to adopt a foundation depth of 2 ft.(0.6m) for normal soil like gravely soil, red soils etc., and use the un coursed rubble masonry with the bond stones and good packing. Similarly the foundation width is 2 ft.(0.6m).To avoid cracks formation in foundation the masonry shall be thoroughly packed with cement mortar of 1:8 boulders and bond stones at regular intervals.

It is further suggested adopt arch foundation in ordinary soil for effecting reduction in construction cost up to 40%.This kind of foundation will help in bridging the loose pockets of soil which occurs along the foundation.

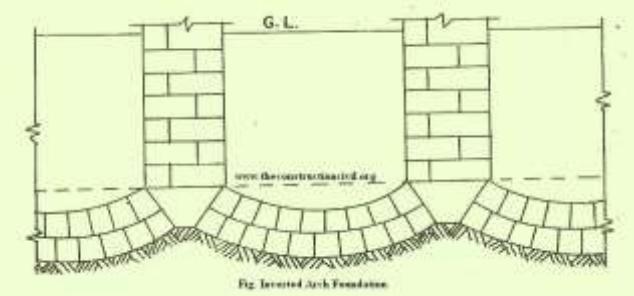


Fig-1

2.2 Plinth:-

Portion of the building between ground surrounding the building and top of the floor immediately above the ground. It is suggested to adopt 1 ft. height above ground level for the plinth and may be constructed with a cement mortar of 1:6. The plinth slab of 4 to 6″ which is normally adopted can be avoided and in its place brick on edge can be used for reducing the cost. By adopting this procedure the cost of plinth foundation can be reduced by about 35 to 50%.It is necessary to take precaution of providing impervious blanket like concrete slabs or stone slabs all round the building for enabling to decrease erosion of soil and thereby avoiding exposure of foundation surface and crack formation.

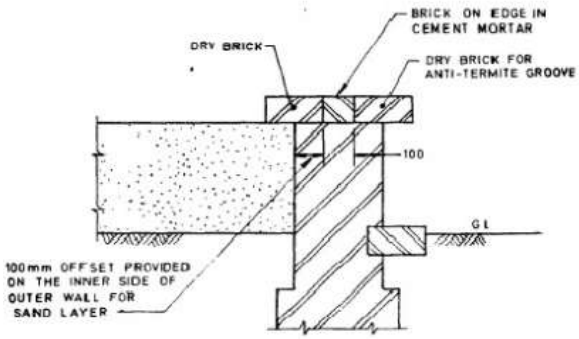


Fig-2

2.3 Walling:-

Wall thickness of 6 to 9″ is recommended for adoption in the construction of walls outside walls and 41/2 ” for inside walls. It is suggested to use1st class burnt bricks which are immersed in water for 24 hours and then used for the walls.

For low cost housing rat trap bond wall, concrete wall are used.

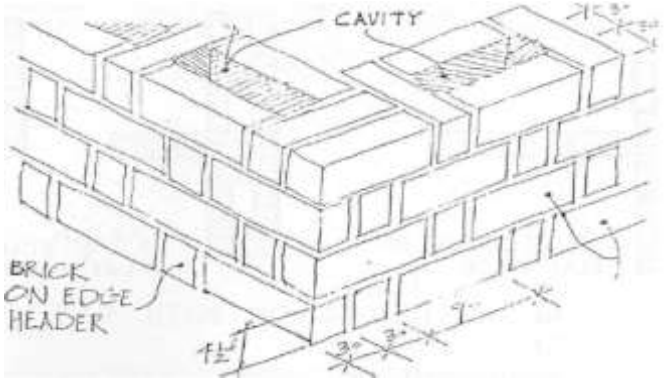


Fig-3

2.4 Lintel:-

Lintel is the horizontal structural member which is fix over opening like door, windows and other openings. The traditional R.C.C. lintels are costly. It can be replaced by brick arches for small spans and save housing cost up to 30 to 40% over the traditional method of construction. It is used to support the structure over the opening. By using arches of different shapes a good architectural pleasing appearance can be given to the external wall surfaces of the brick masonry.

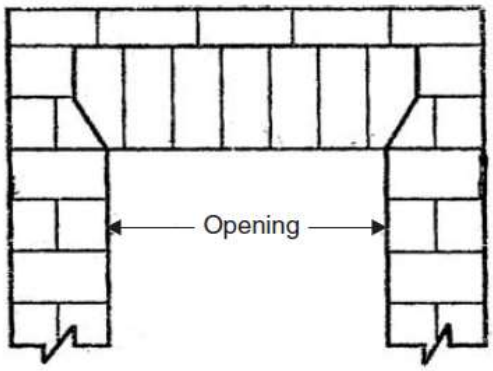


Fig-4

2.5 Roofing:-

Roof may be defined as the uppermost part of the building which is constructed in the form of a framework to give protection to the building against the rain, heat, snow, wind, etc. Normally 5″ (12.5 cm) thick R.C.C. slabs is used for roofing of residential buildings. By using rationally designed in situ construction methods like filler slab and precast elements the construction cost of roofing can be reduced by about 20 to 25% .

2.5.1 Precast RC plank:

Precast RC planks 30 cm wide * 3-6 cm thick * up to 1.2 m long. It is applicable for economical and faster construction of floors and roofs of single and multi-storage buildings. This method results in saving 20% in overall cost, 25% in cement and 10% in steel as compared to conventional R.C. slab floor / roof.

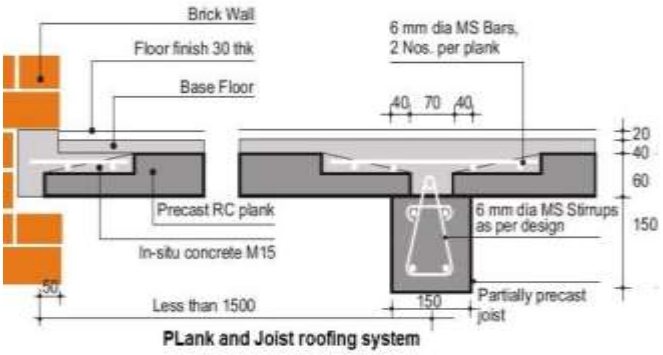
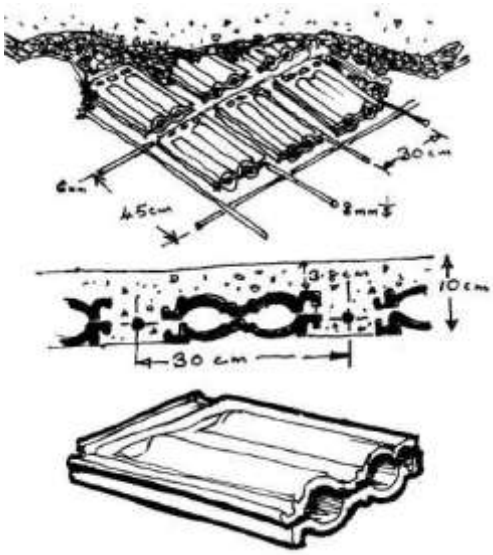


Fig:5

2.5.2 Filler slabs

Filler slab is normal RCC slabs where bottom half concrete portions is replaced by filler materials such as bricks, tiles, cellular concrete blocks, etc. The concrete is weak in tension. These filler materials are so placed as not to compromise structural strength, result in replacing unwanted and non-functional tension concrete, thus resulting in economy. It has no need of plaster.



2.5.3 Ferro cement channel/shell unit:

Provide an economic solution to RCC slab by providing 30 to 40% cost reduction on floor/roof unit over RCC slabs without compromising the strength. In this slab precast and construction gives less time (speedy), economical due to avoiding shuttering and facilitate quality control.

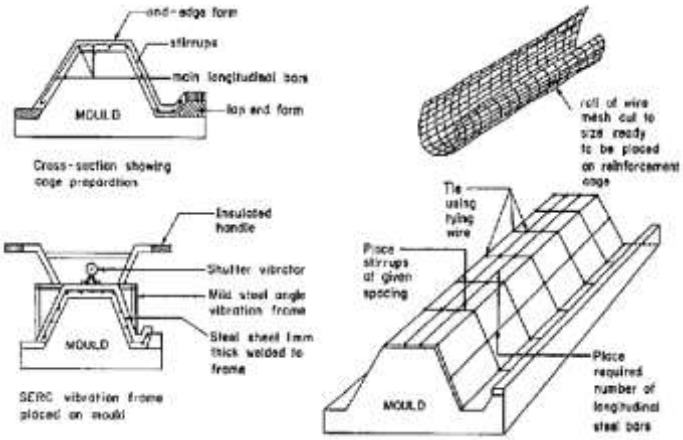


Fig:6

2.6 Flooring:-

Indian pattern stone flooring is one of the most common type off looping provided in houses. This type of flooring is quite durable, easy in construction and maintains economy as compared to tile. The top of the floor is divided into panels, which are rectangular or square in shape. The area of the panels should be less than 2 square meters. Normally Cement Concrete 1:2:4 (1 cement: 2 sand:4 coarse aggregate) of required thickness (say 40 mm) is provided. Polishing of concrete floors adds to its cost.

2.7 Door and window:-

A door may be defined as an purpose of providing access to the users of the structure. The main function of the door in a building is to serve as a connecting link between the various internal parts.

The opening present in wall for providing the ventilation, sunlight, etc called as window. The windows are generally provided to give light and ventilation both to the interior parts of the building.

If the concrete or steel section frames will be used for windows, it saves cost up to 30 to 40%. By adopting brick work and precast components effective ventilation could be provided to the building and also the construction cost could be saved up to 50% over the window components.

2.8 Stair:-

Precast ferro cement staircase can be used instated of R.C.C stair this replacement can reduce the cost of construction by 25%.

2.9 Finishing Work:-

The cost of finishing items like sanitary, electricity, painting, plumbing etc., varies depending upon the type and quality of products used in the building and its cost reduction is left to the individual choice.

3.0 Technologies / Specification

3.1 Foundation

Step footing in solid concrete blocks

3.2 Walling

Solid /Hollow concrete blocks

RCC plinth, lintel, roof level band, vertical reinforcement in corners for earth quake resistance

3.3 Roof/Floor

RCC planks & joist with screed

IPS flooring

3.4 Doors & Windows

Pre-cast RCC door frames

Wood substitute door shutters

Fly ash polymer door shutter for toilet.

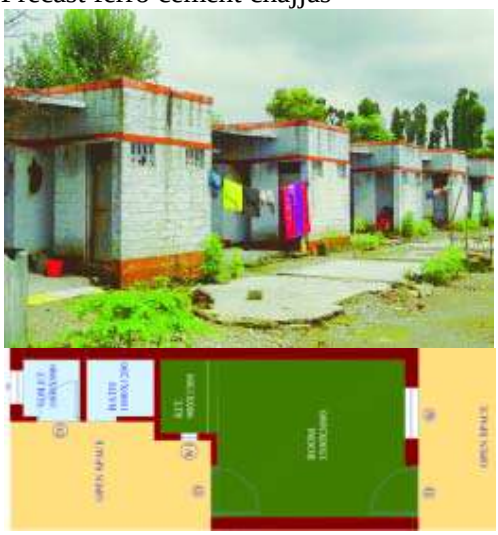
Cement jalli in ventilators and windows

3.5 Others

Internal and external pointing

White wash on walls

Precast ferro cement chajjas



CONCLUSION:-

The above list of suggestions for reducing cost of construction is of general nature and it varies depending upon the nature of the building to be constructed, budget of the owner, geographical location where the house is to be constructed, etc. However it is necessary that good planning and design methods will be adopted by utilizing the services of an experienced engineer or an architect for supervising the work. By using low cost housing overall cost effectiveness to the extent of 25% in actual practice.

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