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Low Cost Home Using Low Cost Materials

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ABSTRACT:In the current analysis, low-cost housing is identified as a future global need. There are now 17.6 million fewer homes than needed in India. For low- and middle-income families in particular, the ideal of home ownership is becoming a challenging reality. In order to enable the general public to build homes at an accessible price, it has become necessary to employ cost-effective, innovative, and environmentally friendly housing technologies for the construction of houses and buildings. In this essay, the construction costs of conventional and inexpensive housing technologies are compared. The investigation makes use of case studies from India. The foundation, walling, roofing, and lintel construction processes are contrasted. The factors that are given top attention throughout construction are the structure's strength and longevity, stability, safety, and mental satisfaction.

KEYWORDS:Low cost, construction method, comparison, cost effective..

I. INTRODUCTION

Since low-cost housing is such a broad notion, it may imply different things to different people depending on their income levels. Any housing that satisfies an affordability criterion is referred to as affordable housing. Various nations have defined affordable housing to show the financial potential of a person purchasing a home. The cost of housing should not be more than 30% of a household's gross income, albeit this percentage varies by area and income level in the United States and Canada. Another thing to keep in mind is that the notion of cheap housing does not simply apply to the three groups described above, but to all citizens of the nation. In order to define affordable housing, there are three essential criteria.

A better understanding and appreciation of the ways of life and cultural values of the local population are required given the rising demand for cheap housing in INDIA and the growing interest of developers to invest in affordable housing projects. Dealing with affordable housing as a product or commodity simply produces unattractive, dismal settings that don't fulfil fundamental requirements or appeal to potential users' preferences

II. LITERATURE REVIEW

The study of literature comprises a thorough examination of the research that was conducted in previous decades with the goal of providing affordable housing. It also examines the findings of the research conducted by various writers and eventually provides the future direction of their research.

1. A.K. Kasthurba et al. discuss the use of laterite as a sustainable building material in their study from 2014 and highlight its benefits as a locally available and cost-effective substitute for more expensive modern materials. Creating rules for the use of laterite in construction applications is the aim. Laterite use is underutilised because there is no standardisation and many testing processes are challenging to complete. Standard size laterites of 390x190x190 mm were chosen for the experimentation and testing processes to evaluate its various engineering qualities because the test sample had demonstrated a large variation in strength. However, it is adequate for residential usage, and the minimum strength requirement should be reviewed..
2. The suitability of produced sand as a fine aggregate material had been researched by B.V.V. Reddy in 2011. The characteristics of concrete and mortar made with M-sand as the fine aggregate were determined in this study, and they were contrasted with those of concrete made with river sand. In comparison to mortar prepared using river sand, mortar made with M-sand had improved engineering qualities (compressive strength, greater workability, bulk density, etc.). When Msand was utilised in place of river sand, the concrete sample, which was of grades M20



and M30, produced results that were extremely satisfactory. As a result, the test programme demonstrated that M-sand is a suitable substitute for river sand and also contributes to cost savings for construction-related operations..

3. M.M. Eldhose et al. (October 2014) used a variety of studies to evaluate the physical characteristics of GFRG Panel and the compatibility of several suitable filler materials. Results were achieved after investigations on the physical characteristics of GFRG panels, including water absorption, compressive strength, and flexural strength. Utilising 3 types of filler materials (Nominal mix-M25, Flyash concrete, and Recycled aggregate concrete) that provided 3 distinct values for d, the compressive strength was also investigated. According to the findings of several tests, recycled aggregate concrete performed satisfactorily as a filler material and increased the compressive strength of GFRG panels. Therefore, it can be concluded that GFRG panels can be effectively used as a low-cost building approach when filled with the right filler material.
4. Concrete waste accounts for 4.7% of all materials used in building construction in India, according to Alone and Sawant's (2014) scorecard analysis of the variables producing concrete waste. A full set of 50 criteria, divided into 5 categories based on site observations, interviews, and questionnaire survey, was completed. For each area, the waste index value was determined, and it was discovered that project management, planning, and methodology had the highest waste index value (227), followed by materials, machinery, and equipment. This led to the conclusion that the factors most responsible for the development of concrete waste and consequently rising construction costs are project management, planning, and methodology.
5. In their 2009 study, Rinku Taur and Vidya Devi T. looked at a variety of low-cost housing issues, such as prefabricated components, the use of locally accessible materials, and the application of new techniques to increase the durability of traditional low-cost materials, making them suitable for use in modern housing needs. Their study examined the applications, benefits, and drawbacks of prefabricated materials for diverse projects. Any alternative technology for mass housing implementation may be influenced by the material's economy and efficacy, and ultimately by the market. As an alternative to using an alternative technology for the full construction process, an intermediate sort of methodology for low-cost housing can therefore be recommended.

III. POSSIBLE TECHNIQUES & METHODOLOGIES FOR LOW COST HOUSING

Alternative Materials Used

Materials Use For Conventional	Materials Use For Low Cost
OPC Cement	PPC Cement
Cement Plaster	Gypsum Plaster
Vitrified Flooring	Oxide Flooring
Teak Wood Doors	Fibre Doors
Clay Bricks	Fly ash Brick, AAC and Hollow Blocks
River Sand	Artificial Crushed Sand
VOX false Ceiling	PVC false Ceiling
Conventional Slab	Hardy's Slab/ Puff Sheets

1. Fly ash Brick

Fly ash bricks are manufactured using cement, sand/stone dust, and industrial byproducts such as fly ash. These types of bricks are now used all over the world and are overtaking clay bricks in popularity. Due to their uniform size, pleasing tint that resembles cement, and flawless finish, fly ash bricks have a very pleasant appearance. Due to homogenous size, the amount of mortar used for walls and plastering is reduced by almost 40–50%. Plaster of Paris (gypsum plaster) putty can be used without the need for a baking coat of plaster. These bricks are defect-free and free of stones, organic material, wrap-age, defects, and lime nodules.

2. Pozzolona Cement

Pozzolona is a material that contains reactive silica and may be natural or synthetic. Portland Pozzolona Cement is a type of cement created from a blend of pozzolanic materials. This cement contains gypsum, pozzolanic components, and OPC clinker in certain proportions. Among the pozzolanic materials are fly ash, volcanic ash, calcined clay, and silica fumes. Between 15% and 35% of the cement's weight of these components are added. Organic waste that has been treated again is used to make pozzolona cement. It helps



produce high-quality building materials and reduces environmental pollution by successfully utilising natural waste.

3. Hollow Block

The term "hollow block" refers to units with a core-zero area greater than 25% of the overall area. The hollow space within the blocks allows the masonry to have effective sound, heat, and moisture insulation. You can get light-colored concrete blocks on the market under the brand name "Siporex." Since the air space in the block accounts for 25% of the block's overall size, these hollow blocks enable the adoption of thinner walls, which ultimately results in more floor space. This conserves material. Precast blocks have a smoother surface, therefore less plaster is needed because of this.

4. Oxide Flooring

Oxides are used to colour the floor in a form of flooring known as oxide flooring. The most common type of flooring is red oxide, commonly known as kaaviyidal, despite the fact that it is available in a range of colours. In the past, traders from Portugal and Italy brought it to India. Older dwellings can be seen virtually everywhere in India, although they are particularly prevalent in South India where the design originated in Kerala

5. Hourdi slab

Typically, China and Dubai are where one may find these slabs. Robust Bricks were used to build this slab. Hardy bricks are hollow, concrete-based bricks. By using hollow blocks to fill in gaps in the slab thickness, less concrete is utilised overall, which reduces the slab's own weight. When compared to a standard slab, this type has a greater thickness. The sturdy slab has a thickness of 0.27 m.

6. Puff Sheet

Polyurethane sandwich panels, or PUFF panels, are typically comprised of two metal sheets sandwiched together. Due to its many benefits, sandwich puff panels are now often employed in steel constructions. A PUFF panel supplier or PUFF panel manufacturer should be able to customise them to your specifications because PUFF panels are also available in various sizes based on the necessity.

7. Fiber Door

The majority of fibreglass panels are Energy-Star certified, and fibreglass doors are quite environmentally friendly. These fibreglass doors, which are very fire-resistant, have recently evolved into a kind of structural requirement in India. Fibreglass doors are now carefully manufactured and created in India to provide that unique feel to the space. They are inexpensive, fashionable, and quite small.

IV. EXPERIMENTAL RESULTS

Cost Of Clay Brickwork	Type Of Brick	Cost Of Brickwork	Percentage Reduction in cost
2,50,801	Fly Ash Brick	2,12,800	16%
	Cement Hollow Block	1,74,008	30%
	AAC Block	1,76,765	29%
	Interlocking bricks	2,02,841	17%

Cost of Cement Plaster	Cost of Gypsum Plaster	Percentage Reduction in cost
63,321	46,880	25%

Cost of Vitrified Flooring	Cost of Red Oxide Flooring	Percentage Reduction in cost
92,960	47,260	48%



Cost of Conventional Slab	Cost of Hourdy’s Slab	Percentage Reduction in cost
1,93,097	1,44,890	25-30%

V. CONCLUSION

For low- and middle-income families in particular, the ideal of home ownership is becoming a challenging reality. For the building, it is essential to use creative, cost-effective, and environmentally friendly housing technologies. This study compared the cost-effectiveness of adopting low-cost housing technologies with that of conventional building techniques. There were two case studies done in India. It was discovered that employing low cost housing technologies instead of conventional construction methods for walling and roofing, respectively, can save around 25% and 27% of the construction cost, including material and labour costs. This demonstrates the advantages and market trends for adopting low-cost housing technology.

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