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An Awareness of Low Cost Housing Materials Used in Buildings

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ABSTRACT

Affordable housing is a term used to depict abiding units whose absolute lodging cost are considered reasonable to a gathering inside a predetermined pay range. In India, the innovation to be taken on for lodging parts ought to be to such an extent that the creation and erection innovation be changed in accordance with suite the degree of abilities and dealing with offices accessible under metropolitan, metropolitan and rustic circumstances. The attempting to bring down the measurement through the arrangement of minimal expense, supportable structure materials and advancements while perceiving the Adequate Shelter for All plan, resolving to, Access to protected and solid haven and essential administrations perceived as vital for an individual's physical, mental, social and monetary prosperity and ought to be a basic piece of our pressing activities for the large numbers of individuals on the planet Without respectable day to day environments.

KEYWORDS: *Polymers, Resin panels, Fly ash, Building material, Low cost housing, Sustainable, Conventional Materials*

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INTRODUCTION

Population explosion in India has created several problems one of them is housing. Managing the response to the continuous increasing housing needs of Indian population, has long been a problem for its government. Providing affordable housing remains a major concern of the government. Housing shortages have stimulated efforts to develop alternate building materials and construction methods that use minimal resources because of the increasing shortage of energy and raw materials.

To achieve the current housing requirement the scale of economic investment is huge and this will even lead to shortage of conventional building material for construction. This shortage of conventional building material is aggravating the situation of affordable houses.

It also needs to be recognized that the construction industry adversely affects the environment, through physical disruption, the depletion of key renewable resources like fertile topsoil, forest cover and excessive consumption of energy. Therefore, there is a strong need to adopt environmentally appropriate materials by up-gradation of the conventional materials. Due to limited national resources –both financial and conventional building materials, there is a need to use alternative building materials, which are sustainable and cost effective to meet the Housing demand.

Low Cost Housing-

Low cost housing may be defined as a provision of housing, which caters to the requirements of masses within their income capabilities, without sacrificing the strength, performance and life of the structure. Low cost housing is to reduce construction cost through appropriate use of materials, skills and technology but without sacrificing the performance and structure life. Low cost housing technologies and to cut down construction cost.

Fig.1 Low cost & affordable housing

Low Cost Housing Materials

In a house, materials form a major component - 65 to 75% of the total construction. It is widely accepted that the cost of building a house must be brought down to an affordable level by using innovative cost effective building materials. In India the Construction materials can be divided in to three categories:

- Traditional material: mud, thatch, bamboo, timber, bricks, stone, clay roofing tiles etc.
- Conventional Materials: Cement, steel, glass, plastic etc.
- Innovative materials: agricultural waste, stabilized soil and cement blocks, Industrial waste such as Fly ash for cement and bricks.

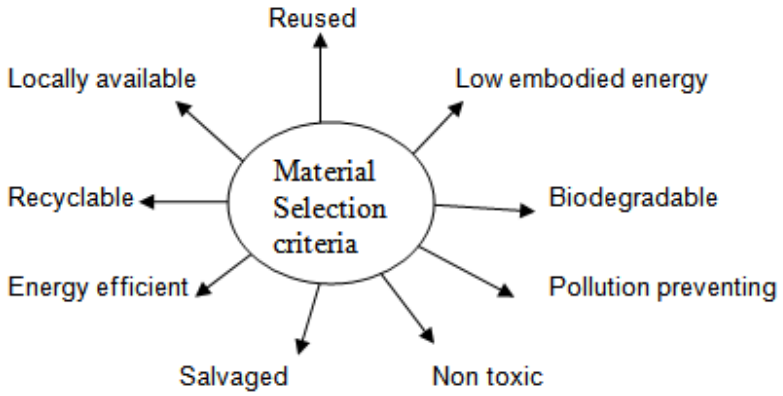

Fig.2 Low Cost Housing

In the selection of building materials the following factors play important role:

- Availability
- Cost effectiveness (life cycle cost)
- Durability (strength of material)
- Maintainability

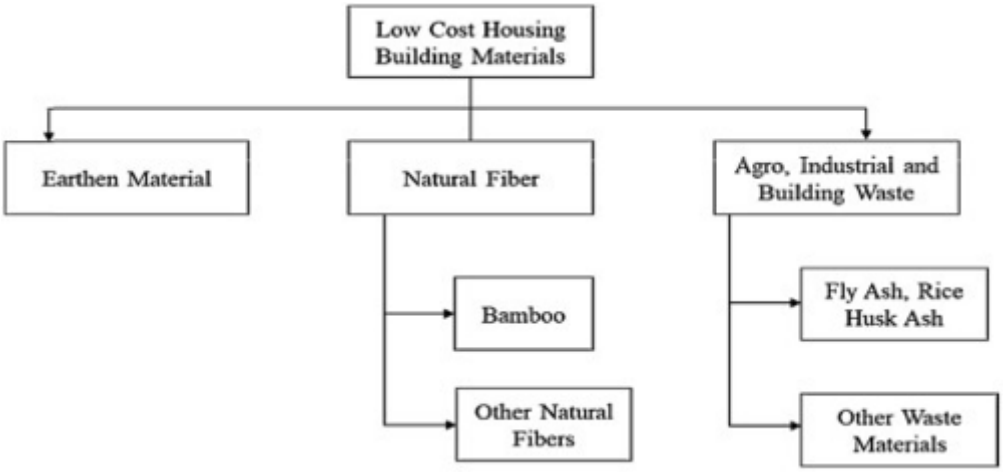

Fig.3 Low Cost Housing Materials

The traditional materials are still widely used in rural areas. The main reason for such wide use is the availability of these materials locally at low cost. The initial construction cost of these traditionally build houses is lower but the life span and durability of house is also less when compared with houses built with conventional materials.

Smart Design

In this project I am focusing on alternative building materials. The outer skin of a building is typically the most expensive component. In reducing the costs of these outer building materials it is possible to significantly impact the overall cost of construction. In completing this project, I acknowledge that building with better materials is only part of the solution building truly low-cost and sustainable houses means rethinking the way we design our homes.

Fig.4 Smart Design

The best solutions are simple. We need to build smaller, exchanging square footage for higher quality materials, so as to create comfortable, interesting spaces. Many homes built today are enormous in proportion to our human bodies, making residents feel isolated and uncomfortable. We need to design regionally-specific homes that temper existing weather conditions, not work against them. Rather than overpowering the elements with energy-intensive technology, designers need to relearn how to take advantage of the best aspects of a local climate while minimizing the worst. This is passive design: design that is not dependent on energy-intensive technology to be comfortable. There are many design elements that can be incorporated with passive design, such as natural ventilation and selectively used heat gain. By building our houses smaller, considering the conditions of the local environment and capitalizing on these natural forms of energy, it is possible to significantly reduce financial and environmental costs.

Fig.5 Smart Design

Sourcing and Construction

Building with salvaged materials costs between 10 and 50 percent less than buying comparable new materials. In some cases, the owner of an dilapidated building will allow people to simply take whatever they can safely remove. This makes the take-down process a little easier for the owner, with less material to deal with, and the person salvaging receives the materials that cost nothing more than time and labor. This process of finding and re-using, like rammed earth construction, is more time-intensive that building with store-bought, new materials, its takes research and planning, but the outcomes are well worth the added time and consideration that goes into a building.

Fig.6 Construction layout

Wood is the most commonly salvaged material because it is so ubiquitous in both old and new construction. Wood can be salvaged from all different areas of a building: siding, structural timbers, existing wood flooring, interior paneling, doors, etc.19 Reclaimed lumber, depending on its makeup can be used as both a structural and non-structural building material. The best reclaimed portions to use as structural support are old timbers and beams. These pieces of wood they are so inherently sturdy and sound because when there were first employed, they were harvested from the strongest among a forest of the old-growth trees. As such, reclaimed timber often exceeds the structural qualities necessary to meet local building codes because codes now are based on much younger and less sturdy trees.

Fig.7 Construction layout

Eco-friendly Prefabricated Construction

Prefabricated construction involves the transportation of building parts manufactured in a factory to a site where they can be assembled into a finished building. There are examples of this type of construction in America as early as the early English settlement in Cape Ann, MA, where they made panelized fishing sheds. The real increase in this type of building came with the Industrial Revolution, as industrialized, mass-produced materials typically lend themselves to prefab construction. Elements such as cast iron, structural steel, large sheets of glass can be manufactured off site, and then easily assembled on site. Between 1908 and 1940, catalog giant Sears Roebuck and Company sold more than 100,000 prefab home kits to Americans.

Fig.8 Eco-friendly Prefabricated Construction

Climate change is considered as major environmental challenge for the world. Buildings have a significant and continuously increasing impact on the environment since they are responsible for a large portion of carbon emissions and also use considerable number of resources. Buildings account for one-sixth of the world's fresh water withdrawals, one quarter of its wood harvest, and two-fifths of its material and energy flows. The construction sector consumes considerable amount of energy from the production of basic building materials, its transportation and assembling called embodied energy. Brick and cement are one of the profuse pollutant industries with massive CO2 emissions. It is estimated that each million clay bricks cause to generate 300 tons of CO2 and each million tons of OPC cause to generate equal quantity of CO2.

Fig.8 Eco-friendly Home layout

Environmental and Economic Advantages

Rammed earth construction is inherently sustainable and affordable because the building is made from natural materials gathered on site. Walls can be constructed from the earth dug for the foundation of a building. This reduces a considerable amount of pollution from mining or deforestation that would be necessary with other types of construction, and also reduces the environmental and economic cost of transporting materials to the site. Structures made from rammed earth are highly recyclable. Earthen buildings can be abandoned and their ruins will simply melt back into the ground from where they were dug. Remains can be used to grow vegetation or be re-used again as a building material.

To analyze the viability of rammed earth as a building envelope in a cold, wet climate such as Connecticut, there are numerous factors that need to be considered. These factors include the design's ability to resist thermal losses, to prevent air infiltration, to provide a high indoor air quality, to control moisture condensation and infiltration, and the availability of local materials, all under that specific climate environment.

Fly ash Bricks

Bricks may be made from a number of different kinds of material, but they must usually possess (can be capable of developing) a certain amount of plasticity. Fly ash is one of them. Use of Fly ash with soil and firing the bricks with agricultural waste will reduce the cost of the building material i.e. Clay bricks. Fly ash is an industrial waste, which is just a burden for the industry we can take it free of cost from the industries and can utilize it for the manufacturing of fly ash bricks.

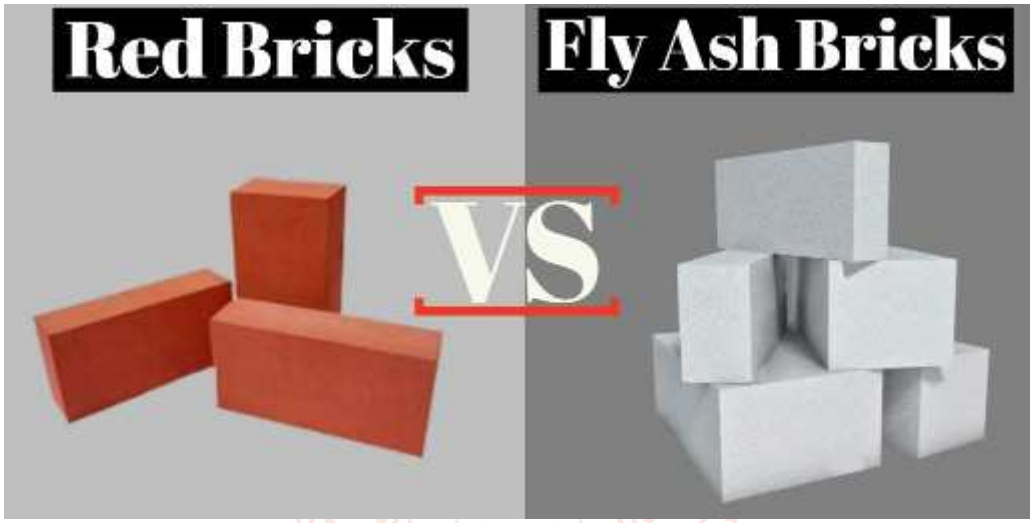

Fig.9 Fly ash Bricks

Clay-Flyash burnt bricks

Flyash generally contains 5 to 6% of unburnt carbon, incorporation of Flyash, therefore, results into a better-burnt product together with an economy in fuel consumption. It has been experimentally verified that saving of about five tons of coal per Lac bricks could be achieved by mixing 40% flash ash by volume with the clay for making bricks. Advantages of Clay Flyash Bricks: a) Reduction in drying shrinkage and about 15 to 25% of the weight of the bricks with better thermal insulation. B) The properties of bricks are not affected by mixing Fly ash with the clay.

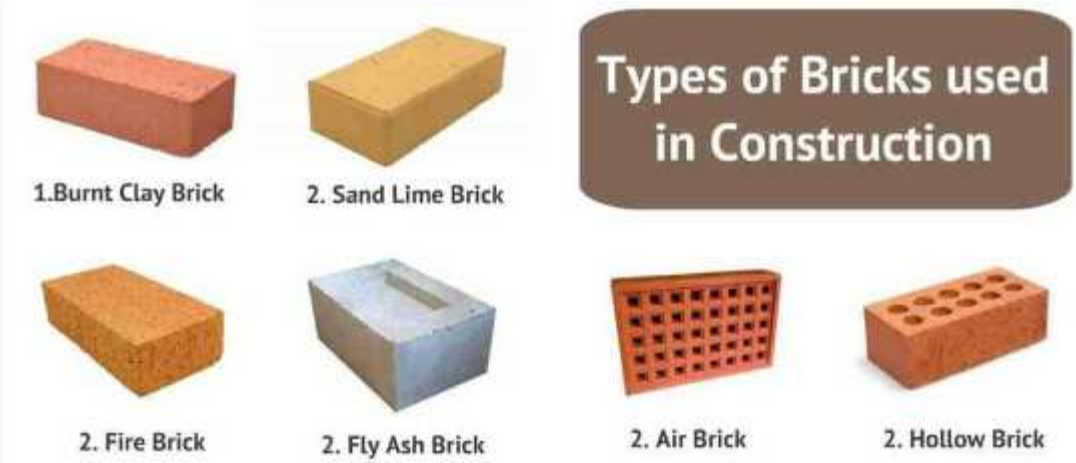

Fig.10 Clay-Flyash burnt bricks

Fly ash lime bricks

Fly ash sand-lime bricks can be used as an alternative material for burnt clay bricks, which is one of the important building materials used for construction of housing and buildings. These bricks are chemically bonded bricks manufactured by utilizing 80- 82% of Fly ash, 9-10% of lime, 9-10% of sand and 0.2% of Chemical accelerator (Covered by Central Fuel Research Institute, Dhanbad's patent). For manufacturing Fly ash lime bricks no firing is needed. Curing in steam for predetermined period is employed to enable the bricks to gain desired strength. Thus, Fly ash lime bricks satisfy the basic parameters of building units, moreover the bricks are also suitable for the construction of building in coastal areas where normal red clay burnt bricks are found to be affected.

Fig.11 Fly ash lime bricks

Fly ash-Sand-Lime-Gypsum Bricks

Fly ash, lime and gypsum are available in mutual proximity in many regions. An economical alternative to conventional burnt clay bricks will be available, if these materials can be used to make bricks and hollow blocks of adequate strength. Fly ash-Sand-Lime-Gypsum Bricks can be used for walls in housing and all types of building construction. These bricks are manufactured by utilizing Flyash.

Fig.12 Fly ash-Sand-Lime-Gypsum Bricks

Environmental benefits of Fly ash

- Fly ash utilization reduces the requirement of clay, sand, lime stone in cement manufacturing and hence conserves natural resources.
- Fly ash utilization reduces the cement requirement and hence carbon-di- oxide liberation during cement manufacturing is reduced.
- Fly ash utilization reduces the topsoil requirement for land filling / brick manufacturing and saves agricultural land.
- Fly ash utilization achieves increased strength of the finished concrete product without increasing the cement content.

CONCLUSION-

There are numerous ways separated from utilizing minimal expense lodging materials like decrease of material waste, legitimate arranging utilizing approach which is less refined and including less capital speculation. Reception of any elective strategies and materials needs a surefire market and this relies upon adequacy of the some. It additionally relies upon the trust of customers on the new materials. Thus, in this paper materials which can acquire trust are picked. In this review, Fly debris as a manageable substitute structure material is examined and the capability of this material to be utilized as substitute it is brought out to fabricate materials. Appropriate mindfulness should be made in the lodging area for the utilization of Fly debris as an Alternate structure material for the minimal expense lodging. This material whenever considered and grew appropriately holds the way to address the ongoing lodging needs. Mass lodging targets can be accomplished by supplanting the ordinary materials and more than that, the most common way of utilizing modern waste material like Fly ash in enormous amounts, is all the more ecologically adequate.

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