Green Materials – Future of Construction

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Abstract – In India various tremendous environmental problem are rising in construction industry due to leading urbanization. Increasing demands of housing sector which lead to consumes more energy, resources and raw materials which are responsible for the rise in carbon content in air and which are harmful to environment and human health. Nowadays we are facing various environmental impacts due to which we need to build with more sustainable materials which will lead to reduction of impacts on environment. In cities like Pune we are already noticing the change in weather patterns, hotter summers, shorter winters, insufficient monsoons. So taking the preservation of the city's ecology and finite energy resources seriously is now more than important.

Developers need to find better, more sustainable methods of designing their buildings in order to reduce their negative environmental impact. Therefore it is need of hour to use more sustainable methods and locally available materials which are eco-friendly and a lead for better tomorrow. Considering to all this impacts this paper consist a five green construction materials with their advantages, disadvantages, durability and economical aspects in construction industry which can be an effective alternate material for conventional materials.

Keywords: Sustainability, Ecofriendly Construction Materials, Energy Efficiency, Cost Efficiency, Durability.

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1. INTRODUCTION

Buildings are actually responsible for maximum resource consumption therefore green building is an effective solution to the present construction. Green building is described as people with healthy, comfortable and safe living, working and activities of the space, while the building full life cycle (material production, construction planning, design, construction, operation and maintenance) process to achieve efficient use of resources energy, disabilities, the water, materials) with minimum impact on the environment of buildings, also known as eco-building, sustainable architecture.

The green building uses materials which are locally available energy efficient, sustainable, and durable. Material such as lime which reduces carbon foot print as compare to cement in the building construction. Using lime in building it absorbs carbon rather than emitting which also lead to reduce hazardous impact on environment.

2. NEED OF GREEN MATERIALS IN CONSTRUCTION:

1. The demand for material has been continuously rising with the increasing need for housing both in rural and urban areas.

2. The resource used to manufacture construction materials affect the environment by depleting natural resources, using energy, and releasing pollutants to the land, water.

3. Commercial exploitation of traditional building materials by various industries has aggravated the situation. It has, therefore, become necessary to think over this problem seriously and to provide some sustainable solution to make the alternative materials available to solve the housing problem.

2.1 Advantages of Green Materials:

1) Better functional efficiency

2) Cost effectiveness

3) Better durability

4) Ease of construction

5) Better finish

6) Minimum waste

7) Less maintenance cost

8) Less energy intensive

9) Minimum defects

3. LIME

3.1 Advantages of lime in Construction

- Lime provides benefits to mortar and plaster in both the plastic and hardened state. In the plastic state, lime can enhance workability and water retention.
- In the hardened state, lime products react with carbon dioxide to regenerate calcium carbonate or limestone. This is a slow, gradual process that increases the hardness of the finished surface and allows for the closing of hairline cracks by a process called autogenous healing.
- Lime can react with pozzolanic materials in the mortar or plaster to produce a cement-like product
- The strength of lime-based mixes can be modified according to the needs of the particular application. This is beneficial in restoration applications where low strengths and high vapour permeability are needed.

3.2 Disadvantages of Lime in Construction:

- It is slow process because reactions during water softening takes place in very dilute solutions and room temp.
- Softening capacity of this process is less.
- Soft water obtained by this process consists of dissolved gases.
- Lime concrete takes long time to set as compare to the cement mortar.

4. SAND-LIME BRICKS

4.1 Technical Advantages

i. The compressive strength of bricks decreases breakages/ wastages during transport & handling.

ii. Due to uniform size, the joint thickness can be between 6 to 10mm, so also the plaster thickness, which is almost 50% of that required in case of handmade clay brick masonry. The cracking in plaster is reduced due to lower thickness of joints and plaster & basic material of the bricks, which is more compatible with cement mortar.

iii. After proper pointing of joints, the brick can be directly painted in dry distemper, Cement paints, textured paint without the backing coat of plaster. However paints to be applied after the curing of the masonry wall.

iv. Plaster of Paris/Gypsum Plaster can be directly applied on this bricks without any backing coat of plaster.

v. Due to lower water absorption property, only sprinkling of water is enough and bricks do not need soaking in water. Soaking in water for longer period is not recommended.

vi. Before plastering, just wet the surface. Overnight watering is not recommended.

vii. In case of non-load bearing structures, these bricks can be used with frog downwards, thus further saving quantity of mortar.

4.2 Disadvantages of Sand-Lime Bricks

1. Requires skilled labours.

2. Cannot break the brick in small pieces.

5. ECO – FRIENDLY TILE

5.1 Advantages

1) Creates local jobs and supports local artistry.

2) It can be installed over existing tile and salvaged or disposed of easily.

3) It increases Indoor Environmental Quality performance.

4) Cheap in cost compared to other type of tiles.

5) It reduces transportation cost.

6) It is maintenance free.

5.2 Disadvantages

1) Skilled labours are required.

2) Proper supervision is required.

3) Proportions should be made properly.

4) Time consuming.

6. ECO – FRIENDLY GLASS – SGG REFLECTASOL

Advantages

1) The solar control properties and reflective appearance help keep the interiors cool and bring the power consumption down.

2) It can be used as well for external or internal use.

3) Its low light transmittance guarantees "visual comfort" against direct sunlight.

4) The combination of high light reflectance and low light transmittance provides internal privacy, even in buildings with large glazed areas.

5) It has a reflective quality of creating a one-way observation effect in certain lighting conditions, transmitting light whilst screening vision. Beveled edges: to create a unique decorative effect (e.g. traditional internal doors)

6) SGG Reflect sol Glass can help you not just cut the heat, but also cut your electricity bills and bring you monthly savings.

7) Unlike your regular window glass that lets you sweat it out all through the day, the SGG Reflectasol Glass range is specifically designed to control sun's heat from heating up the interior

Disadvantages:

Main disadvantage of the SGG Reflectasol glass is its cost. Its cost is 20 times higher than the normal clear glass.

CONCLUSION

Green building concepts are not new in India. The vernacular architecture had better methods of going green, in terms of design and materials. Locally available materials were used predominantly. In recent years, because of the urbanization and industrialization, the environment is getting depleted slowly. The scarcity of natural resources is more observed. The main reason for greenhouse effect is due to the deforestation and the concrete jungles without any greenery around. Due to global warming caused by the greenhouse gases (Carbon dioxide, Methane, Nitrous oxide, Chlorofluorocarbons (CFCs), Hydro fluorocarbons (HFCs) and Per fluorocarbons (PFCs).) climatic changes are being occurring in all parts of India which leads to the loss of agriculture and many resources. To come up from this problem one need to build and start awareness in the people of building green and stop the emission of harmful gases.

Sand Lime Bricks: - Sand lime is cheaper than the clay bricks. They are light in weight and easy to work with it. They are made up of lime and hence contain the characteristics of it. They are durable. They can be easily broken in to pieces and hence it is recyclable and can be used in other places.

Eco-friendly tile: - these tiles are cheaper and durable than the conventional tile. They are laid in patterns on the ground and designed as per the clients requirements. It is maintenance free and gives better indoor quality.

Coloured Lime plaster: - It carries out the two activities at a time that is plastering and Colouring. Once it is done it is maintenance free and no need of recolouring. It is cheap as compare to the conventional paints and plastering. Colours used are natural soil colours.

Eco-friendly glass: - The cost is more than the normal clear glass, but eventually it turns out to be cheap. The solar control properties and reflective appearance helps to keep the interiors cool and bring the power consumption down.

The awareness of green building concepts must be brought in the society to avoid further depletion of the atmosphere by implementing these materials in the construction industry it will lead to the sustainable building and environment friendly which will avoid the depletion of atmosphere. It not only reduces the cost for the consumers but also leads to their healthy environment. By using their properties at right places we can get the maximum advantage of it without harming the nature. This will ultimately save the natural resources that are getting depleted nowadays. So the concept of green buildings and the usage of green materials should be widely utilized to protect our environment and it will be a boon to the future generation.

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