



SUSTAINABLE HOUSING TECHNOLOGIES

“Sustainable Housing aims at economic, social and environmental sustainability from planning to implementation phase and at the same time results in housing that is accessible, affordable, and environment friendly.”



DG BUNGALOW, NIRDPR

CENTRE FOR INNOVATIONS AND APPROPRIATE TECHNOLOGIES
NATIONAL INSTITUTE OF RURAL DEVELOPMENT
AND PANCHAYATI RAJ

APPROPRIATE WALLING TECHNIQUES

ADOBE MUD BLOCK

These bricks are made by casting wet clay soil in steel moulds and tamping with trowels. Durable, cost effective, water resistant and no risk of shrinkage or cracking of walls. Cost about 30% less than brick walls.

RAMMED EARTH WALL

Damp mixture of normal earth and 8% cement is rammed in layers inside a mould to form the wall. Compressive strength of rammed earth walls is higher. Skilled labour is not required. Costs about 25% less than brick walls.

RAT TRAP BOND

Bricks are kept on "brick on edge fashion" in the 9" thick walls to form cavity between the walls. The cavity induced in wall provides good thermal insulation & requires no plastering. Requires 25% less bricks & 40% less mortar. Costs about 23% less than normal brick walls.

WATTLE & DAUB

Walls are made using split bamboo matt, mud plastering, one coat of lime plaster with non erodible mud mix. Economical for places where bamboo is available. Light weight & earthquake resistant structure. Good thermal insulation & low maintenance. Costs about 40% less than brick walls.

CSEB BLOCKS

It is made by compressing mixture of normal soil and cement (8%) using simple handed operated or machine press. Durable as it is 2-3 times stronger than conventional bricks. No plastering is required and can be locally made. Provides good thermal comfort and aesthetic beauty. Costs about 25% less than brick walls.

APPROPRIATE ROOFING TECHNIQUES

FERRO CEMENT CHANNEL

Bricks casted into panels of size 1.10m x 0.50m between of reinforced concrete beams. Durable and provides good thermal insulation. Costs about 22% less than RCC slabs.

BRICK PANEL ROOF

Tiles made like cones using burnt clay are used for roofing. It provides good thermal insulation. No steel, concrete, plastering and centering required. Local potters can get employment. Costs about 35% less than RCC slabs.

CONICAL CLAY TILE

Tiles made like cones using burnt clay are used for roofing. It provides good thermal insulation. No steel, concrete, plastering and centering required. Local potters can get employment. Costs about 35% less than RCC slabs.

FILLER SLAB ROOF

Filler materials like clay tiles, bricks, coconut shells, clay bowls are placed between reinforcement while concrete is poured. It enhances thermal comfort giving an aesthetic look. Costs about 25% less than RCC slabs.

JACK ARCH ROOF

Bricks are used in form of arches between 2 beams or walls. No use of reinforcement and concrete. Aesthetic look and cost effective. Costs about 23% less than RCC slabs.

BRICK DOME ROOF

Bricks are arranged in layers using cement mortar 1:3 "brick on edge" for roof. No steel or concrete is used for the domes. Good thermal insulation and durable. Costs about 32% less than RCC slabs.



WATTLE AND DAUB



ADOBE MUD BLOCK



CSEB BLOCKS



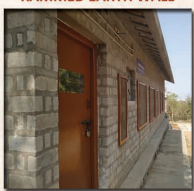
BAMCRETE WALL



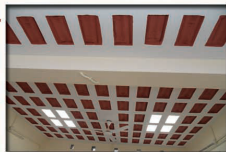
RAT TRAP BOND WALL



RAMMED EARTH WALL



FLY ASH BRICK WALL



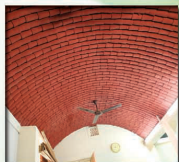
FILLER SLAB ROOF



JACK ARCH ROOF



BRICK DOME ROOF



CONICAL GLASS CLAY TILE



FEROCEMENT CHANNEL



BRICK PANEL ROOF



PRE CAST CONCRETE SLAB

APPROPRIATE FLOORING TECHNIQUES

IPS FLOORING

The IPS flooring is laid with base layer of concrete and top coat with cement mortar and colour oxide. It is durable with variety of colour patterns. Costs about 30% less than the vitrified tiles.

TERRACOTTA TILE

Terracotta tiles are made up of brunt clay. They provide natural look and thermal comfort inside the buildings. Costs about 10% less than the vitrified tiles.

APPROPRIATE FOUNDATION

UNDER REAMED PILE

Under reamed piles are bored and then concreted at the sites as foundation. Used in black cotton soil. Saves about 25% in cost over the conventional method.

RANDOM RUBBLE

Made with normal uncoursed rubble stone masonry using locally available stones. Foundation is strong and high skilled labour is not essential. Costs about 20% less than RCC footing and column foundation.

ARCH FOUNDATION

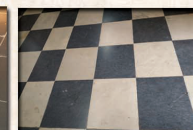
Suitable for deep foundations. Bricks or stones are used to form arches between two columns of stones or bricks. Saves materials like cement, sand, and stones. Costs about 20% less than RCC footing and column foundation.

STUB FOOTING

Suitable for deep foundations. Bricks or stones or RCC can be used to stub columns. Saves materials like cement, sand, and stones. Costs about 20% less than RCC footing and column foundation.



TANDOOR STONE



BETHAMCHARLA STONE



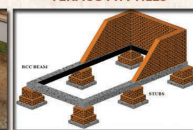
IPS STONE FLOORING



TERRACOTTA TILES



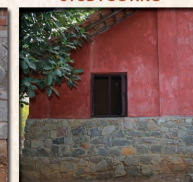
PILE FOUNDATION



STUB FOOTING



ARCH FOUNDATION



RANDOM RUBBLE STONE

APPROPRIATE PLASTERING



No external painting on the walls and hence the saving will be around 12%

MUD PLASTER



Saving in cost compared to cement plaster will be around 10%



Saving in cost compared to the cement plaster will be around 20%

NON ERODIBLE MUD PLASTER



No wood is used. Saving of cost about 40% can be achieved.



CORBELLING OF BRICKS



No lintels, hence the saving will be around 20%

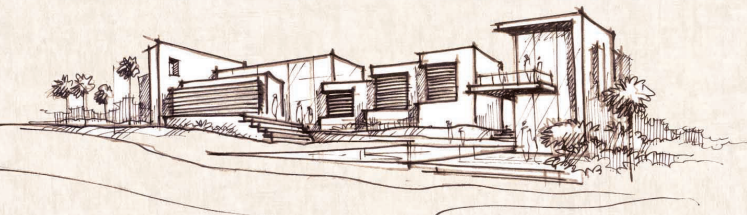
ARCH WINDOW



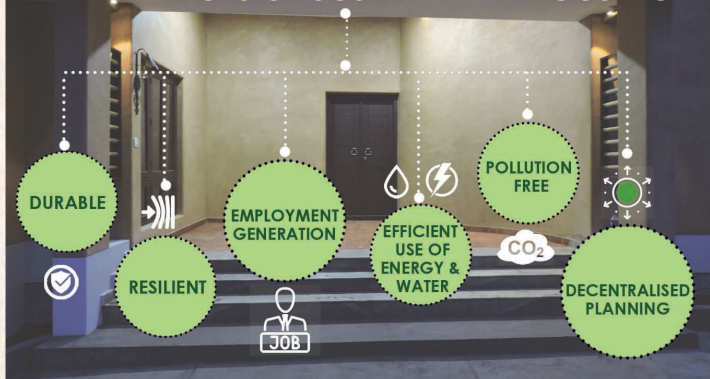
APPROPRIATE WINDOWS & DOORS

FEATURES OF SUSTAINABLE HOUSING

Size	Universal Design
Layout	Renewable Energy
Location	Recycled Materials
Insulation	Water Conservation
Orientation	Sustainable Materials
Local Materials	Rain Water Collection
Intelligent Planting	Selection of Doors and Windows



ADVANTAGES OF SUSTAINABLE HOUSING



THE WAY FORWARD



IISE office by Laurie Baker



Blind School by Chitra Vishwanath



DG residence by Padmashri G. Shankar, HabitatTechnology Group

Sustainable housing technologies are far superior in quality and durability. It's adoption has been low due to lack of awareness among engineers and the general public.

However, many notable architects only promote Sustainable Housing technologies in many prestigious projects. Setting examples by promoting these in government projects can bring about better awareness and confidence among people.

Under MGNREGS, FFC grants and WECD projects, Sustainable Housing Technologies can be adopted to create the buildings required to be constructed. Use of local materials and traditional construction techniques can provide better thermal comfort enhancing its aesthetic look.

STRATEGIES FOR PROMOTING SUSTAINABLE CONSTRUCTION TECHNOLOGIES

Building Demonstration Units

Awareness Creation & Capacity Building

Documentation & Communication Materials

Promoting Entrepreneurship

Standardisation and Codification

Green Rating and Incentivisation

FOR FURTHER INFORMATION, CONTACT:

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