

Design Strategies for Contemporary Coastal Architecture

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Abstract- Vernacular architecture of Indian Coastal region has been enriched for several centuries. Several different vernacular architecture lies in the nine states having different languages and culture. So does the architecture of these area is different but there is one common thing in them is that they have survived for so long while kept maintaining the functional efficiency, beauty, structural strength ,cost effective use of local material. Which is providing various techniques and methods which can be incorporated in modern architecture in order to achieve sustainability, energy efficiency and cultural values to our contemporary Indian coastal architecture?

This research is all about Innovative ways to incorporate various coastal vernacular techniques in order to achieve sustainability in the modern coastal architecture.

Index Terms- Vernacular, coastal, efficiency structural strength.

INTRODUCTION

Divers' vernacular architecture lies in the coastal areas having different languages and culture. So does the architecture of these area is different but there is one common thing in them is that they have survived for so long while kept maintaining the functional efficiency, beauty, structural strength ,cost effective use of local material.

AIM

To find innovative ways to incorporate various coastal vernacular techniques in order to achieve sustainability in the modern coastal architecture

OBJECTIVES

- To study various coastal Indian vernacular architecture techniques to which can be applied to modern urban coastal architecture.
- To comparative study these various coastal Indian vernacular in terms of materials,

workability, energy efficiency, indoor & outdoor environment quality.

- To find the various ways to use studied techniques and materials in modern coastal architecture.

SCOPE

- The scope of this project is to adapt the various Indian coastal vernacular architectural techniques and materials into modern coastal architecture.
- There are eight states and six majorly adopted vernacular architecture is there in Indian coastal region where variety of materials and techniques are there which can be used in modern urban coastal architecture. These six major vernacular architecture which I studied to choose are Bhonga vernacular architecture of Gujarat (Hazira & Dahej), Konkan architecture, Vernacular architecture of Karnataka and Andhra Pradesh, vernacular architecture of Kerala, Vernacular of south Chennai, and vernacular architecture of west Bengal (Digha area).

LIMITATIONS:

India has coastline of 7,516.6 km, which covers eight states and has large variety of vernacular architectural construction techniques. And looking to shortage of time among these all vernacular architecture my study will be in focused in above mentioned six vernacular architecture styles in which only one or two cases will be studied and proposals of design consideration will be from only theses six vernacular architecture.

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the

period of five years. The time series monthly data is collected on stock prices for sample firms and relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

COASTAL_AREA

Coastal area ordinarily characterized as those interface ranges between land and sea, including substantial inland lakes. Seaside ranges are different done capacity Also form, progressive and don't give themselves great with meaning by strict spatial limits. Dissimilar to watersheds, there are no correct regular limits that unambiguous depict coastal area.

- The term “vernacular architecture” in general denotes to the casual building of structures through traditional building methods by local constructors without using the services of a professional architect. It is most widespread form of building.
- Down-to-earth, modest, original, traditional assemblies made of local materials and following
- Well-founded forms and types, normally painstaking in three categories: agronomic, domestic, and Industrial.
- The art, construction and oral traditions of villages are native vernacular expressions of diverse culture of India.

Various Coastal Vernacular Architecture of India:

- BHONGA VERNACULAR ARCHITECTURE
- KONKAN ARCHITECTURE
- VERNACULAR ARCHITECTURE OF KARNATAKA AND ANDHARA PRADESH
- VERNACULAR ARCHITECTURE OF KERALA
- VERNACULAR ARCHITECTURE OF SOUTH CHENNAI
- VERNACULAR ARCHITECTURE OF WEST BENGAL

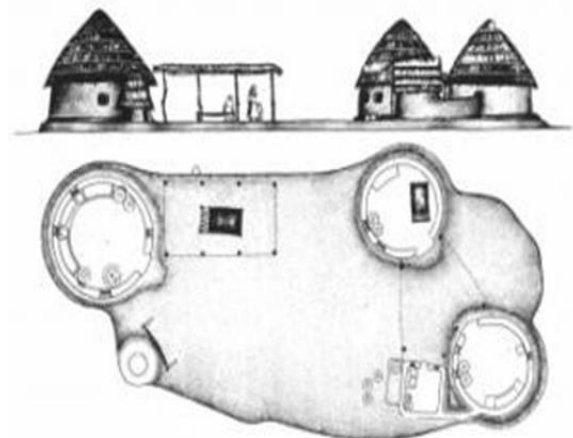
BHONGA VERNACULAR ARCHITECTURE

Traditional vernacular of Gujrat’s coastal area. It is the part of Bhuj vernacular Architecture .It is known for its traditional look use of locally available material, and proper ventilation indoor environment in the adverse climatic condition of Thar Desert area.

Known for cooling by day and Heating in the night fulfill the demand of comfortable indoor environment in the region.



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DESIGN

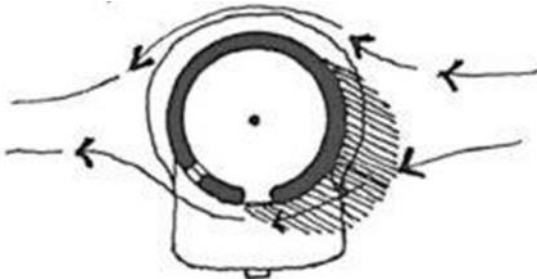
The building do not share mutual walls with neighboring buildings. When disconnected from adjacent buildings, the archetypal distance from a adjoining building is 3.0 meters. Bhangra is circular in plan, with tubular shaped walls and outdone with

conical roof. The inner width of the Bhonga is typically between 3m to 6m. A Bhonga commonly has only three opening one door and two trivial windows

The main purpose of this building typology is single-family house. Chief door of the Bhonga is the only way of escape. A typical house has the area for men and its exterior space, the porch and the space for women and child. These different constructions are not interconnected because they blow at the junctions. However, a horizontal clay podium about 50 cm high, delimits the house unit. Besides, it is a way to avoid rainfalls inside the house; It is a kind of brink, making borders actually.



section of bhonga hut



Air circulation in circular form

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KONKAN HOUSE GROUPS

The people who cultivated, who fished and who have built their houses with their highly established skills

of artistry always deliberate a house that was their own but that also fitted to the village. It was only one unit of the many that made up the community street. One house was built, then the next and the next. Ways that were thus formed were shaded from the p.m. sun.

The rooftops are built in timber understructure with Mangalore slates. The partitions are in brick and verandahs are shaped with brick bends that offer structural provision. The plan of the house is primarily rectangular. The tetragonal tiled roof is seen as a public element all over the coastal towns of the Konkan area



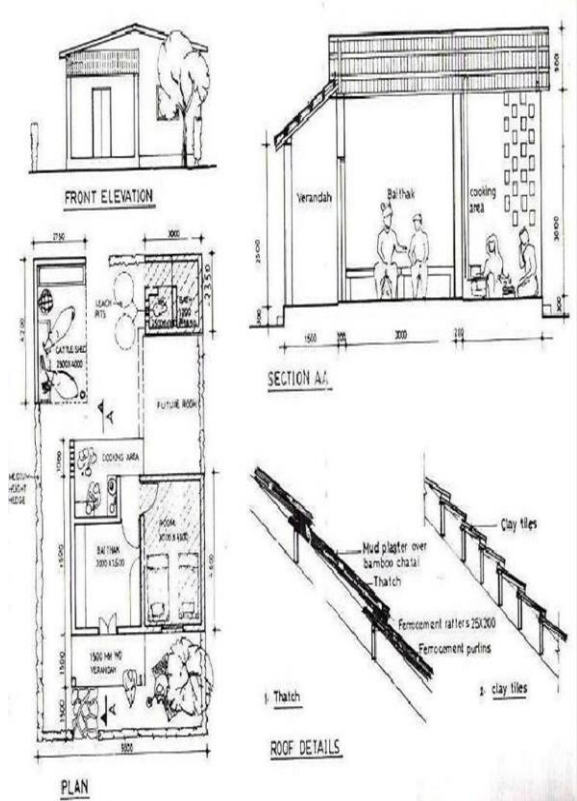
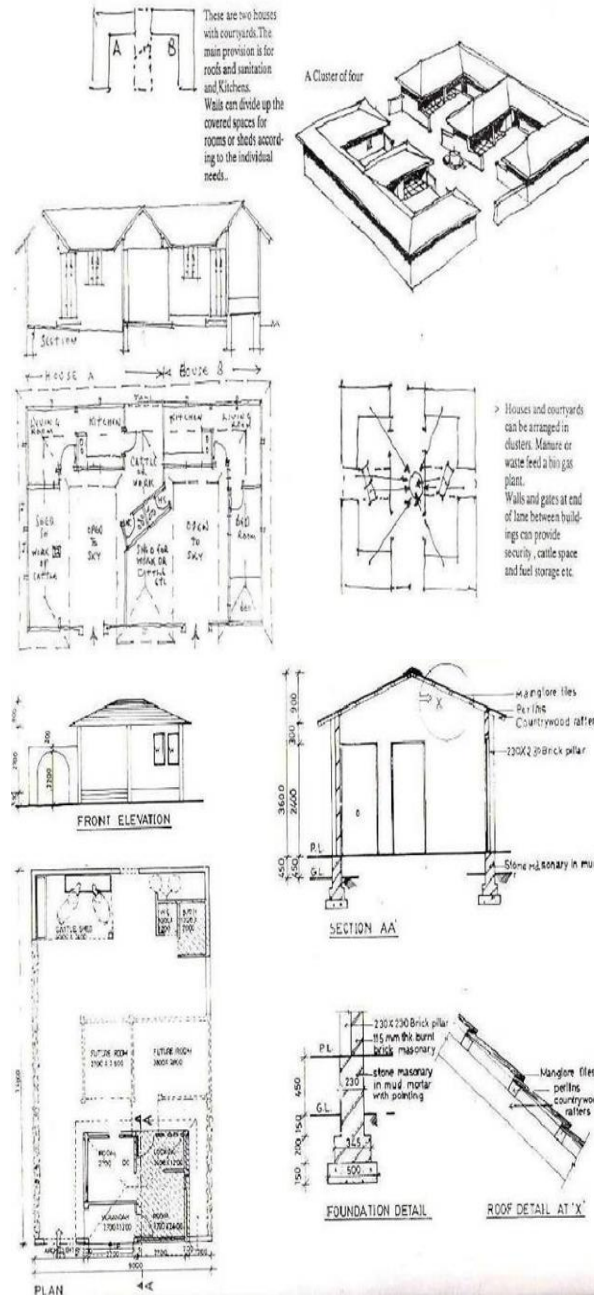
VERNACULAR ARCHITECTURE OF KERALA



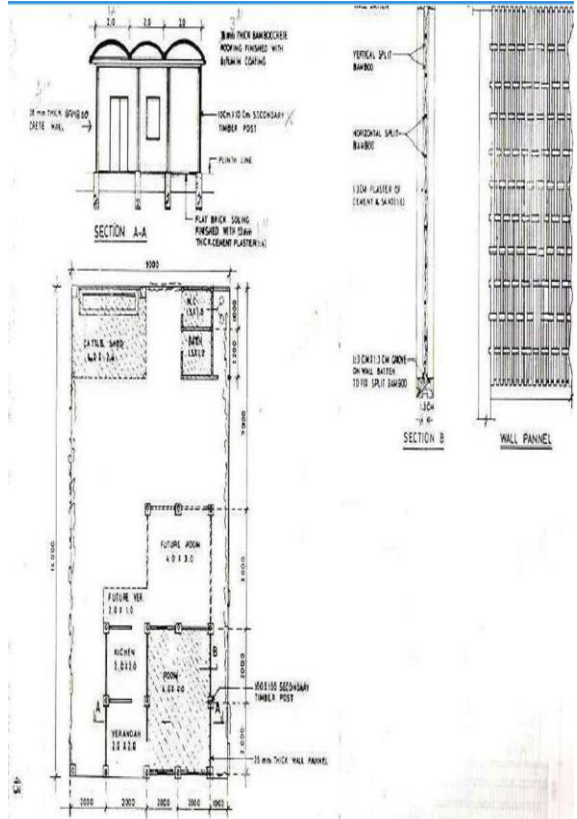
Kerala is situated on India's tropical Malabar Coast having nearly 600 km of Arabian Sea shoreline. The temperature ranges from maximum average 35°C and minimum 22°C. The rainfall is heavy from south-west and north-east monsoons. To protect the building from sun and rain the roof comes down. The verandah also protects the outer walls from sun and rain. They had windows with jaalis to prevent glare and inner courtyards for ventilation. The width of the verandah varies from 2 ft. to 12ft.

DATA COLLECTION

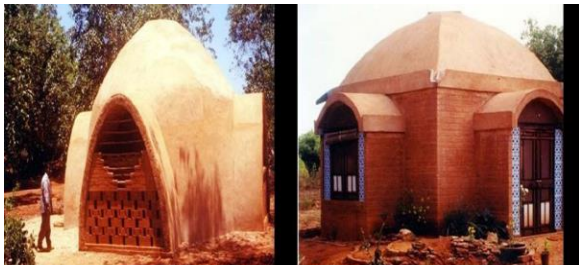
Rural houses:

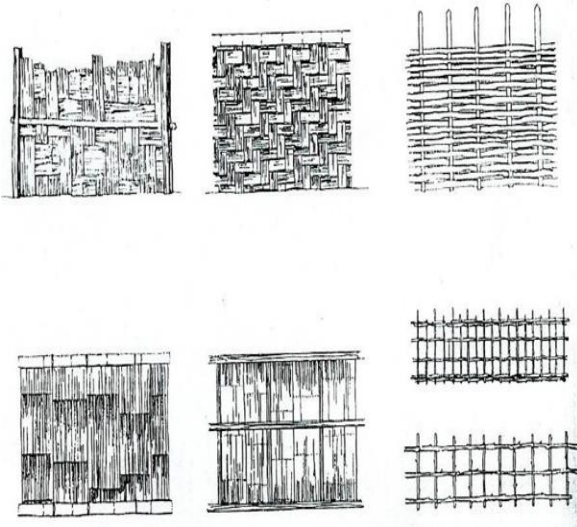


Bamboo Construction: bamboo for walls



AUROVILLE EARTH CONSTRUCTION





MATERIALS

Vernacular panache varies from place to place and be contingent on the locally accessible materials and low cost exhaustive construction practices. The architecture completely be contingent upon the place and the type of building substantial available for creation.

On plane lands, the houses are generally made of mud or sunbaked bricks and then plastered inside out. Sometimes, the sludge is mixed with hay or cow dung and trounced with lime. In north and north eastern states of India, bamboo is willingly obtainable. Bamboo is used for the production of all parts of the household as it is flexible and resistant. Additional material which is commonly used is thatch from floras such as elephant grass, paddy and coconut. In the southern states of India, the habit of clay tiles is castoff for pukka tiling while coconut palm is generally used in kuccha houses.

S.no.	Construction technique	Materials used	Building component	Areas where it is used	Characteristics
1	Kathi-Kuni and Koti banal	Stone and timber	Wall	Shimla, Kullu, Kinnaur, Garhwal and Kumaun regions	Good seismic and thermal response, good aesthetic value
2	Dhaji-Dewari	Timber stone/mud	Wall	Kashmir and Chamba	
3	Taaq system	Timber and brick	Wall	Kashmir	Good seismic and thermal response
4	Stone houses	Natural stone dressed or undressed	Wall	Kashmir, Jammu, Himachal, Uttarakhand	Good thermal response
5	Wooden houses	Timber	Wall, roof, floor, staircase	Kashmir, Himachal, Uttarakhand	Good seismic and thermal response
6	Mud houses	Mud	Walls	Leh, Ladakh, Lahaul Spiti	Good thermal and climatic response
7	Sun dried bricks houses	Earth	Walls	Outer Himalayan regions	Good thermal and climatic response
8	Dry stone walls	Stone	Wall	Kangra Chamba	
9	Brick houses	Baked bricks	Walls	Outer Himalayan regions	Good response against weathering agencies

Ordinary construction materials are gravels, timber, clay and palm leaves Laterite, obtainable across the state, is an uncommon neighborhood stone which gets solider and intense with involvement with amazing air. Laterite squares might be reinforced in mortars of shell lime, which has been the complete restricting material utilized as a part of obsolete Structures. Lime mortar can be improved in quality and introduction by admixtures of vegetal juices.

Wooden is the major basic physical lavishly accessible in numerous assorted varieties in Kerala - from bamboo to teak. Potentially the adroit decision of wooden, correct joinery, sly meeting and sensitive cutting of timber work for braces, dividers and rooftops edges are the exceptional physiognomies of Kerala design.

A blended method of development was advanced in Kerala design. The stone work was restricted to the plinth even in huge structures, for example, sanctuaries. Laterite was utilized for allotments. The rooftop development in timber was protected with palm leaf covering for most developments and once in a while with tiles for strongholds or sanctuaries. The outer of the laterite segments were either left in that capacity or surfaced with lime mortar to fill in as the base for fresco painting.

DATA ANALYSIS

Different vernacular construction materials and their analysis.

Mud:

A mix of earth and liquid, is economical, practical, functional and eye-catching. It is easy to effort with, and it takes beautification as well. Mud is chiefly useful in humid and hot environments. Mud is a ordinary building material that is found in abundance, especially where other Structure materials such as bricks, stone or timber are rare due to affordability and or obtainability. The mud building is a great reserve that emphases on building assembled of mud brick, bumped earth, compacted earth block and other means of stone structure. The propagation of notion to use mud and enhanced methods in order to raise the level of existing in the populace is a very relaxed idea. This can go a lengthy way no pet only in the formula of moving the look of populace centers, rural as well as urban, but also in solving environmental problems and problems related to energy and other

determinate resources. Numerous reasons for using mud as a building material is called below:

Energy Depletion

In mud building, least fossil fuel vigor is consumed and is obviously abundant throughout the world, where as in brick building fossil energy is consumed for engineering process and transport.

Reusing

Reusing of contemporary resources for construction is classy. Reusing of dirt does not need vestige fuel and labor obligation is also less. The distinguishing of secondhand soil for building leftovers the same while in modern construction material it gains inferior atmosphere after recycling.

Profusion

The profusion obtainability of soil in large areas helps the parsimoniously weaker section of the society to afford the mud erection. It is easily adaptable and the knowledge can be transported easily.

Housing request

A enormous shortfall of housing request in urban and rural areas related with imperfect capitals on all fronts brand it absolutely essential that the casing explanation have to be greatest operative, complete optimum and effectual use of all possessions of property and construction material.

Construction with earth is undeniably a fitting and cost and liveliness effectual knowledge that has a great future. By using fitting structural practices and maintenance methods mud constructions can be cast-off in practically all climates. In this type of structure locally accessible materials are used and good volume of money can be saved. Deprived individuals can pay for such a type of house construction; in this situation mud design can be well-thought-out as a replacement housing technology.

TIMBER

Timber is a regularly utilized building material in various parts of the biosphere on account of its sensible cost, simplicity of working, eye-getting passage and acceptable life expectancy if secure from sogginess and bugs. However, forests are an

acknowledged ordinary supply that need be safeguarded, essentially in parts with circumscribing precipitation. As great a considerable as wood might be, there are areas where different assets ought to be measured initially, just on a protection establishment. Timber for structure is realistic from numerous disparate classes with widely factor physiognomies. A few classes are clutter deal as little extremes for light building, while different classes are permissible to set up with the goal that woody might be sawn from the expansive logs. The species that gather little, modest shafts in rather short mounting periods Frequently create in the fringes of agronomic land in amassing to can be utilized needing risk to the nature of the area. The incalculable types of timber have various carnal highlights that will be pondered in connection to their utilization in structure development.

Bamboo

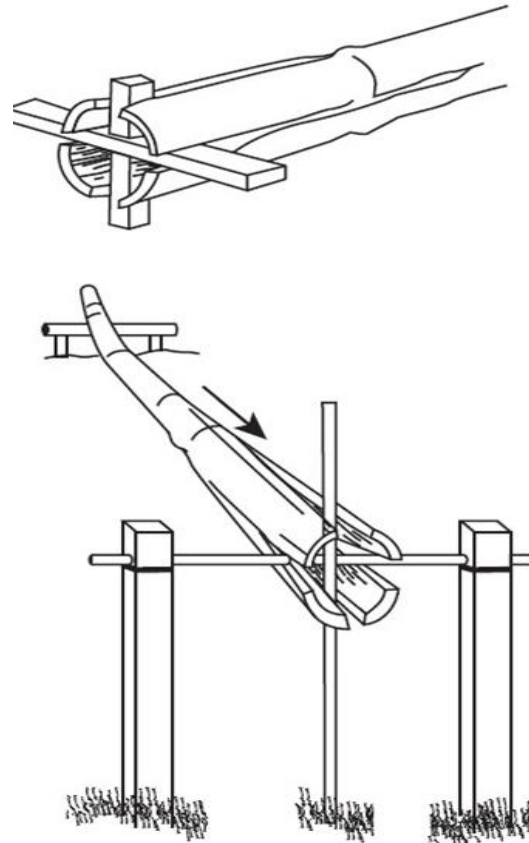
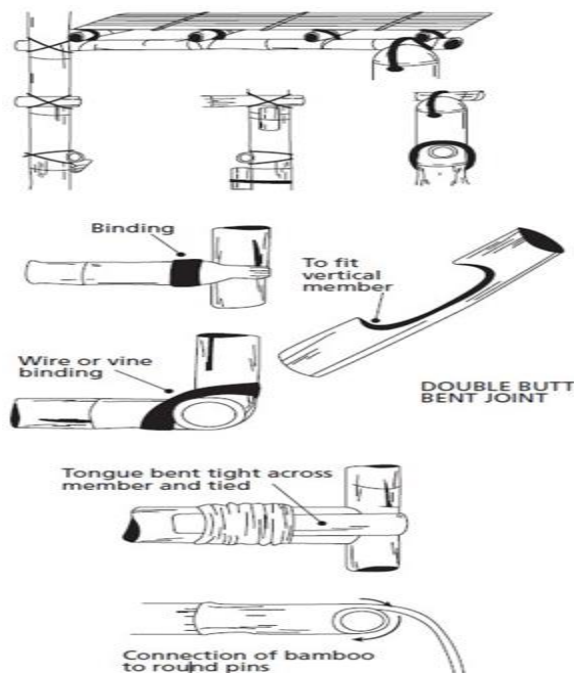
Bamboo is an interminable grass with more than 550 species, found in tropical, subtropical and gentle zones. It contains a tremendous level of fiber, which has high ductile, turning and focusing on restrain. Regardless, bamboos have a couple of inadequacies that most remote point their application. The low quality of bamboo is one of its most bona fide blemishes, nearby its instability and inclination to part easily. This generally keeps the usage of nails. Cutting a score or a mortise in a bamboo unquestionably diminishes its complete quality. The cure is the use of center points as spots of assistance and joints, and the usage of lashing materials (strings) set up of nails. Dry bamboo is to an awesome degree defenseless against fire, nonetheless it can be secured or treated with a fire-retardant material.

The quality properties of bamboo vary comprehensively with species, creating conditions, position inside the culm, seasoning and clamminess. Overall bamboo is as strong as timber in weight and especially more grounded in strain. In any case, bamboo is weak in shear, with just around 8 percent of compressive quality, while timber usually has 20–30 percent. It is used generally in building advancement, for divider shafts, diagrams, housetop improvement, and material and water channels and, in the wake of part, to outline fixed sheets or woven divider, floor and rooftop sheets.

New stalks of bamboo are molded yearly in bunches getting to be plainly out of the spreading roots. The individual bamboo shoots complete their improvement inside a period of 4– 6 months in the primary creating season. A fortifying system occurs in the midst of the resulting 2– 3 years, and the culm accomplishes advancement after the fifth or sixth year, or even later depending upon the species. It must be cut before blooming since it loses its insurance and passes on resulting to growing. A couple of bamboos create to 35 meters in height, while others are near shrubberies. Separations crosswise over change from 10 mm to 300 mm. Bamboo without proper seasoning and added substance treatment will ruin and be struck by frightening little creatures, particularly if used as a piece of sticky regions, for instance, in earth foundations.

Bamboo joints

As nailing causes part and scoring, radically diminishing the quality of a bamboo culm, lashes is by and large utilized as restricting components for surrounding. They might be part from the bamboo itself, or produced using vines, reeds or the bark of specific trees. Delicate aroused wire is additionally utilized for authoritative. Bamboo can be kept from part when bowing by bubbling or steaming it to start with, at that point twisting it while hot.



Natural fibers

Common strands have been utilized for working since antiquated circumstances. Sinewy materials can be utilized without anyone else's input as roofing material or for dividers and mats. Common strands can likewise be joined with water powered setting fasteners to influence different sorts of material board, to divider board, square and shingle. Creature hair is frequently utilized for strengthening mortar.

Thatch

Thatch, regardless of whether made of grass, reeds, palm or banana leaves, is vulnerable to rot caused by organisms and bugs, and to decimation by flame. Additive treatment is attractive yet costly. A treatment joining copper sulfate, sodium chromate and acidic corrosive diminishes assault by decay and may impressively expand the life expectancy of a covered rooftop.

Grass

The utilization of covered rooftops is regular in numerous nations, and reasonable grass can be discovered all over the place. At the point when well

laid and kept up, it can keep going for 10– 20 years or more.

A decent quality covering grass must be stringy and intense, with a base length of 1 meter. It ought to likewise have thin stems without hollows, a low substance of effectively absorbable supplements and the capacity to withstand rehashed wetting without rotting.

Reeds

Reeds must be dry before use as a building material, and can be impregnated or splashed with copper-chrome additives to forestall decaying. Ammonium phosphate and ammonium sulfate are utilized to secure the reeds against flame. Reeds can be woven into mats for use as divider or roof boards, shade rooftops, and so forth. The mats can be put effectively. In tropical regions, cover from untreated reeds may last just 1 year be that as it may, if well laid, treated and kept up, it can last 5– 10 years.

Sisal stems

Before kicking the bucket, at 7– 12 years old, the sisal plant shapes a post shoot to convey the blooms. The post may achieve a tallness of 6 meters or progressively and has a stringy outline, which makes it extreme, yet the inward parts are very delicate. Sisal shafts have constrained basic quality and toughness, yet are here and there utilized for divider cladding in semi-open structures, for example, maize lodgings.

The posts can be part and are participated similarly as bamboo.

Sisal fiber

Sisal fiber is one of the most grounded common strands. It has customarily been utilized as support in gypsum mortar sheets. Sisal filaments can withstand corruption from bacteriological assault superior to anything other natural strands, however are assaulted by the alkalinity of concrete. In any case, inquire about has been completed to influence sisal fiber, to like other normal fiber composites, into a dependable bond fortification for long haul use in uncovered circumstances.

INFERENCES

In the event that anything is to be taken from vernacular engineering, it gives a key association amongst people and the earth. It re-sets up us in our

specific piece of the world and powers us to think as far as unadulterated survival – engineering before the planner. These structures exhibit an atmosphere responsive way to deal with abiding and are characteristic and asset cognizant answers for a local lodging need.

The advantages of vernacular design have been acknowledged all through the substantial piece of history, decreased amid the advanced time, and are presently making an arrival among green engineering and planners.

So as to advance later on of design and practical building, we should first pick up learning of the past and utilize these methodologies as a very much adjusted, deliberate entire to accomplish ideal vitality productivity.

Vernacular engineering over the world give helpful cases of feasible answers for Architectural issues. Be that as it may, these arrangements are thought to be superfluous to present day structures. Despite a few perspectives to the extraordinary, there keeps on being a slant to consider spearheading building innovation as the trademark of current design since convention is usually seen as the antonym of innovation.

The work relies on such thoughts and practices as natural outline, particular and incremental proposition, adjustment, and adaptable and fleeting ideas in the plan of spaces.

Present day engineering is broadly acknowledged to empower adaptability in configuration, frequently coming about because of basic refinement, for example, in posts and pillars instead of load bearing development, versatility of components, minimization, Institutionalization, construction, and economy of structure. These highlights are usually the consequence of specialized improvements.

Present day hone progressively utilizes keen outline parts that can be substituted, redesigned, supplanted, kept up, or repaired.

Any limit amongst custom and innovation is liquid and complex. The skirted vernacular manufactured arrangements, for example, material and basic sensibility, moderation, measured quality, versatility, and in addition material and fleetingness or smoothness, are basically present day.

Drawing upon the similitudes in standards as opposed to in pictures, one can see the conceivable outcomes of transmission of thoughts and systems from

conventional (in vernacular) to present day (as in contemporary illustrations) or from current to vernacular two directional process.

The adjustments in culture and engineering are equal. The effect of one is thought about the other. India's rich social legacy is vanishing because of the impact of urbanization and globalization. With a specific end goal to ensure and monitor our rich social and engineering legacy the components of vernacular ought to be consolidated in the contemporary arranging and design.

The arrangement ought to be made to join vernacular design and customary learning in the approaches. The strategy producers, organizers and designers ought to consider this in their work for advancement of society. The paper finishes up by learning and valuing the standards of vernacular design and incorporating them with the contemporary information and innovation.

CONCLUSION

The expression "vernacular engineering" is been given to the class of design which infers standard development techniques and use of firmly existing materials and devices. Right off the bat, vernacular structures were planned and built with the reason for giving asylum and solace to a mankind, prompting cost productive and supportable building that fulfills the necessities of nearby populace. Because of contrast in social angles, climatic conditions and common assets around the world, the vernacular engineering ideas and plans shift from nation to nation.

The issue of coordinating mainstream or vernacular Architecture may not be principal one in our nation. The need of development and the request we need of development in the developing population of our nation.

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