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## **Architectural Analysis of Mud housing and Adobe Housing: Case of Bengal**

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### ABSTRACT

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The people of have mainly used local and readily available materials in the construction of houses and other necessary structures. Among these construction materials, the highest use of clay is observed in the 'Barendra' region of present-day West Bengal. That trend is still going on today. However, earthen installations are not included in the architecture. The Mud houses, which hold the cultural elements of, deserve to be considered as a source of architecture made of wood, stone and brick. There does not seem to be a proper survey of how many different cultural practices have been associated with the rotation of time in the homes of, how many different cultural practices have been imprinted. So many of those cultural symbols have been erased in the abyss of time. Even after this, some unique patterns in landscape design, shape, room layout, structure, decoration are scattered in the rural areas of. Attempts have been made to address some of the existing architectural features in the existing article. In Bengal, a mud house is one of the conventional housing kinds which might be utilized by bad households particularly in rural areas as well as inside the outskirts of small towns. This building kind is usually one or two memories and preferably used for unmarried-family housing. it is more predominant in less flood-prone areas, i.e., inside the highlands or in mountainous areas. The loads of those homes are usually excessive and their walls are characterised by means of insignificant strength, mainly against forces that act out-of-plane. This form of building is exceedingly susceptible to each seismic forces and excessive pressures due to flood flow. the primary load bearing device includes dust walls of 1.5 to 3.0 Ft thickness, which convey the roof load. Clay tiles, thatch or CI sheets are used as roofing materials. The software of these substances depends on their nearby availability and the ability of the residence owners. there may be no monolithic joint among the wall and the roof. for that reason, those buildings behave poorly below any sort of lateral load (e.g., earthquake, wind)

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Keywords: Barendra, earthen, Clay, Mud, houses

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### **1. Introduction:**

Man has actually constantly constructed with organic materials, developing with mud/earth; by far the most normal of all of the structure resources presents a difficulty that is definitely specialized. Structure is discriminated by cold tough, bulk manufactured today developing materials. While all endeavors being previous replace these with a more plastic material, ecological pleasant product have contributed to an area belonging to the structural of technical measurement from the construction, developing with mud provides chance this is certainly unique of synthesis. Being a pursuit in to the likelihood of soil as building product is particularly related in place like India. The benefits and likelihood of soil construction are never-ending. Conceptually the information presented enables you to mix aspects that are traditional modern contest. An even greater perception of the options associated with product along with the steps being good has created with regards to program and rehearse will make it possible for a redefining this is constructive of suitability for different sorts of construction. Building with soil would be the answer to quite a few waxing property problems and gift suggestions an exciting and down seriously to planet alternative to popular the perpetuation associated with the Jung which is cement the geographical influence in architecture is extensive. It can be said that geographical features determine the style of architecture. The earthen house is also a unique and

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prime example of architecture. But in general, mud houses are not included in the architectural practice of Bengal. Rather, it is the local architectural tradition of, apart from the brick-and-stone structures in the architectural practice of. It does not seem to belong to architecture. That is why there is no discussion of local architectural patterns in the textbooks on architecture. Not only that, in many cases it has been said, "If a building is built in a corner without permanent materials, it will not fall into the category of architecture. In other words, building a building with bricks, stones, marble, etc. will be part of the architectural art." However, no explanation has been given that bricks and stones will be the essential building material of architecture. Probably due to this conservative definition of architecture, the installation of indigenous styles and technologies did not attract the attention of architects. In this context, in the present article, an attempt has been made to focus on the earthen house architecture of the country, especially in the 'Barendra' region.

Bengal contains a history this is lengthy of settlement. The secure this is certainly fruitful vegetations and warm humid temperature influenced men and women to decide in this region. Within the phase that is earlier the current occasion, these agreements experienced improvements being many transformations by individual to generally meet the specific needs of people. These settlements in many cases are known as vernacular design in Bengal. In span of occasion urban areas are actually developed for company, education, and purposes which happen to be administrative. These parts that are metropolitan experiencing changes in that time of globalization. The modifications of design in urban areas are generally occurring faster than in remote regions of Bengal. These adjustments of design in the urban context failed to fulfil a few of the sustainability standards for instance affordable, public and ecological parts while the structure that is vernacular Bengal revealed the durability and flexibility. To identify a solution out for overcoming this adverse situation for its built atmosphere, a the proper learn of vernacular architecture becomes necessary. This research is looking to comprehend the designs in addition to the recognizable improvements of design when it comes down to review of qualities of vernacular structure in Bengal. At present many of the definitions and assessments of vernacular structure derive from an individual or really number that is definitely limited of / attributes. But vernacular structure is not necessarily a product for the mix of one or maybe a feature that are few. It sometimes makes dilemma in assessing the design this is vernacular. In this particular extensive research Amos Rapoport's theory of Determining Vernacular style happens to be utilized to examine the perspectives which are recent vernacular Architecture and to Adhere to the noticeable modification patterns through the years. Rapoport suggests to differentiate all the characteristics of developed settings into and characteristics. In addition, he mentions some standards which are certain to those attributes to evaluate a breeding ground as vernacular, which he mentioned as Polythetic tactic. The tactic was used like the guide this is standard this research. Industry studies have already been done in three periods of man agreements (remote, semi which is urban) in Bengal. The whole set of whole instances are generally assessed under the principle recommended by Amos Rapoport. By Examining the whole set of whole situations, the core features of domestic settings in different quantities of human negotiations are observed out. The implication of that study anticipates to get a comprehending that is quite clear of structure in Wide-ranging situation which is international nicely as for Bengal. These studies also aim to produce a review of the change or transcended routines of vernacular design in Bengal. These studies also want to set a platform to review environments that are vernacular. In the definitive ending on this analysis, talks and guidelines are made for future years renewable developments of built atmosphere by using the essences of vernacular design.

in vernacular architecture. Frequently it's claimed that there are some aspects of vernacular Architecture is an accomplished item of an prolonged and sophisticated method that is definitely evolutionary. Within this process construction has his or her sympathetic harmony inside our society that is definitely nearby planet but also through its particular vernacular architecture will become necessary. In Bengal, like in every additional the main world today, conventional design demonstrated its sustainability with time. The exams of vernacular structure are varied with the different viewpoints of adjustments of rulers in different occasions. But also, in these hundred years which is 21st alterations in the non-urban settlements may be vernacular design in the region (Mowla & Reza, 2000). Bengal possesses a custom this is certainly rich specialists. Various analysts found as well as the good features and also some parts which are negative globalization, existence of sector economic system etc. The settlements that are rural less effected using these their features which can be specific. An analysis of for all the familiarity with this built setting Architecture of Bengal has actually eked away from the geo-climate from the location while accommodating the going on but in a more sluggish rate social norms and practices of the people. This architecture this is certainly localized sometimes known as the design exclusively into the parts which happen to be urbanized. Today improvements are taking place by the impacts of area. The Hindu, Buddhist, Muslims and finally the colonists that are American several variations in personality of forms and associations which can be spatial. These developed this is certainly traditional keep the history with the rulers. Rulers in different instances attempted to enforce and combine new aspects of structure contained in this architecture, that aren't delivering a good environment because of its old engineering this is certainly typical country's prolonged background and cultures. Vernacular architecture also susceptible to change over places and the development and the advancements of its settlements that are real person. The developed varieties of these agreements have actually already been changing because of the influences various factors like societal, economical, technological etc. Architecture in Bengal comes with recently been altered and modified in different instances by using the obvious adjustments of conventional plans, useful design etc. (Denel, 1990).

Construction consists of usage of various development products that want a building that is definitely one-of-a-kind process. But the majority of these structure practices are energy techniques that happen to be rigorous. All of the natural methods happen to be depleting which has made it compulsory that individuals choose products and building methods which require less electricity for its performance. Mud building technique is less power intense and very effective in various issues that are climatic. Planet is among one of mankind's constructing resources which happen to be oldest and the majority of ancient civilizations used it in certain kind. It actually was easily available, low cost, and required and solid only straightforward innovation. In Egypt the whole grain stores of Ramasseum built in adobe in 1300BC still can be found; the best structure of Asia provides segments included rammed planet over 2000 in the past. Iran, India, Nepal, Yemen all have examples of age-old cities and complexes which can be large in numerous forms of earthen construction. It really is significant that the oldest enduring samples of this construction type will be in quite possibly the most arid regions of the planet. The effectiveness of unsterilized planet walls was inspired by the bonding effect of dry clay. If this becomes moist the intensity is actually destroyed and even the wall may even erode or fail terribly fully. Various places have various methods to this condition. From your very first occasions men developed living spaces that had been nearest at palm: away from fibres, dried leaves, stone or unbaked-sundried-mud. Though the start the transformation which is

professional stones of baked clay and components which happen to be mass-produced as cement, iron and glass steadily supplanted the aspect this is basic of structure. The introduction of transportation made it achievable to take construction resources from far away; while the use of modern-day components and usage that will be skilled of building techniques brought about a reduced amount of artistry and art that had given each the locale feeling of location. However, it is the fact that unbaked soil continues to be many buildings which is viable for 1/3rd of world's population-predominantly the poor just who remain on the side-lines of clinking coins economic situation that depends on manufactured supplies. Additionally creating with mud is becoming an thing that is very important preparation brand-new progress. Adopting the energy that is present, technological improvement is made in most countries, as well excitement of architects and area designers possesses included inside the scatter among these new techniques. Nowadays we can choose from conventional design that is 'international plus a even more 'down to earth' method that combines acceptable cost with traditional cultural motifs in a manner that is contemporary

homes of this creation type can be found in villages and suburban areas of the United States of America. usually, areas of much less rainfall dry climate, lateritic soil (wealthy in minerals, typically pink in shade) and wherein the lands are generally above the flood degree, are more suitable for the development of mud homes. This form of housing construction is typically determined in each rural and urban areas. these days in rural and suburban regions, economically solid humans try to construct semipacca (greater permanent) houses. in spite of this, the proportion of mud homes is higher in these regions. This construction type has been in exercise for extra than 200 years. currently, this sort of creation is being built. locally this form of housing is known as a Kutcha. approximately 74% of the

overall homes of Bengal are Kutcha houses, maximum of which is probably taken into consideration as mud houses. the proportion of Kutcha homes is 46% and 83% for city and rural areas, respectively. among mud houses, the ones of rammed earth kind are maximum commonplace but additionally mud block wall structures are getting used. This form of creation is still being practiced in growing countries like Bengal.

### ***Why Mud Works Extremely Well Being a Structure Material***

Mud, a combination of h<sub>2</sub>o and earth, is definitely inexpensive, functional, practical and appealing. It is easy to operate with, also it usually takes adornment as well. Mud is especially beneficial in humid and temperatures being very hot. Mud is just an organic building material this is found in abundance, particularly just where additional Developing materials for example bricks, wood or stone are actually scarce as a result of price as well as access. The soil design is an accomplished reference this is wonderful is targeted on structure made out of soil brick, rammed planet, condensed earth neighborhood as well as other methods of earthen building. The expansion of principle to work with Mud and improved practices in order to enhance the known degree of residing in the population is definitely pleasant concept. This might go an easy method this is certainly very long just by using modifying the look of populace locations, rural also as urban, inside in addressing things that happen to be ecological troubles associated with electricity as well as other finite assets. Various grounds for using soil being a building substance happens to be expressed below: First point

#### **Power Consumption**

In soil building, minimum fossil fuel energy sources are used and is obviously plentiful in the globe, where as in brick building non-renewable energy is consumed for production process and transport.

#### **Recycling**

Recycle of recent supplies for constructing construction is costly. Recycling of earth does not need Fossil work and energy necessity can be significantly less. The characteristic of recycled earth for development keeps the same whereas in modern constructing material it acquires fictional character that is definitely second-rate recycling.

#### **Abundance**

The prosperity availability of ground in large locations assists the financially weaker part of the society to spend the money for soil development. Its effortlessly flexible in addition to the technologies can easily be transmitted.

#### **Housing demand**

A deficit that is big of need in metropolitan and rural parts connected with restricted assets on all fronts allow it to be essential that the property solution have got become best effective o, through ideal and Effective usage of all resources of construction and secure substance.

### ***Prediction***

Since the architectural features of a region are not free from local influences, the influence of local elements, techniques, structures, ornaments, etc., on the architectural practice of has not gone unnoticed. That is why the houses of most of the people of have been called rural architecture. Not only that, it has been acknowledged that the materials and designs used in the rural architecture of have been the main source of architectural creation in the region and have greatly influenced the design of many patterns and verandas of sub-continental architecture. The influence of the rural house has been mentioned as an influence on the architecture of and the architecture of the Mughal Empire Delhi-Agra. Therefore, the study of indigenous architecture is very much needed in the practice of architecture and architectural engineering. Although the architecture of Bengal is not neglected in the education of architectural engineering of the country, it has been recognized as Sustainable Architecture in various works. However, outside of, especially in the corners of Africa and India, it occupies a prominent place in the architectural practice. Probably for this reason, an observation of the geography of the country has said that

the history of how unique and varied the unique Mud architecture was spread in the villages of and its history has not been written. On the contrary, some of the works do not provide proper information and theoretical presentation on the features of earthenware or earthenware.

### *Functionality of different types of soil*

Land designed for the building can be obtained from the internet site itself. The most effective level soil should be removed; it could be stuffed with organic issue. Love a pit and determine that you have different layers of ground. Excavate the sand and clay for building objective. After finishing art soil this is certainly natural changed. All ground kinds happen to be not suitable for development. Often a couple of sorts is often merged to brew a combination this is certainly good.

**Gravel:** all alone is actually not good for mud wall surface construction - the little swelling of stone has absolutely nothing to bind them jointly. Sand: very similar to gravel, it is of no use for structure making by itself - in case blended with clay, for example. Sandy clays or clayey sands, it is basically the perfect mud wall surface soil that is construction. Silt: on its own is usually no for that particular excellent developing wall. It shall store collectively but is not strong. Also, it shall not compact so it is also of no use for pressed blocks or rammed earthwork. Clay: might end up being compressed or rammed but also in drying out they commonly reduce. During the monsoon are moist and expand again and break type.

**Laterite:** can be a type of clay, containing reddish aluminum or iron product. It is actually stable and strong and it's cut off of this surface in prevents and hardens farther along when exposed and loaded to a atmosphere. It is actually needless to say a class structure which is initial content and now we often think of it as a rock. It is wise to follow local thoughts being standard clays and laterites. There does exist some clay which includes proved to be unsatisfactory as designing over and substance many centuries' residents discovered to prevent yourself from these specific clays being improper. Natural soil: are actually primarily pointless for wall structure constructing. A principle that is dependable that when a ground nearly as good for raising plants in, it's not at all perfect for building wall space with. Blends: Find out which grounds are within the blend then the functionality is dependent on the symmetry of the numerous kinds ground mentioned above. Generally, look right at the previous complexes inside your area to see for your own the kinds of land which are employed, longevity, or shortcomings of these complexes which can be old. Correct ground verification should be done before picking out the material with the objective. Better still is to go region this is spherical nearby see and ask concerning the mud that other folks have utilized for building his or her residences. Simple exams which happen to be in-situ be practiced by the individual alone to evaluate the suitability of material as part of his floor. Such as for example stogie examination, biscuit test, hand wash test etc.

### *Symptom of mud*

Based on the attributes of the soil offered, option of helping products and technologies made use of, different signs of soil utilized. Included in these are Adobe or Sun-dried bricks, Cob, Rammed Planet, Pressed stone, Wattle and Daub etc. Cob: the expressed term cob is derived from Old English basic definition "a swelling of rounded mass". It's a structure that will be typical using hand developed lumps if earth mixed with Straw and sand. Cob is not difficult to grasp and cost effective to build. It dries to hardness similar to real that will be thin. This technology that will be ancient's subscribe to deforestation, smog or exploration, nor rely on manufactured materials or power tools. Cob is not toxic and totally reusable. Consistent house windows that are doing work are actually inserted through the cob together with their lintels although the levels happen to be gathering. If corrected screen is Recommended, we are able to use any type or types of glass embedded into the cob. Cob residences were known to for that happens to be final generations.

**Adobe:** Adobe is an accomplished constructing which is all-natural composed of sand, clay, water and many style of stringy or natural substance (stays, straw and manure this is or, which the builders design into bricks using frames and dry in sunshine. Adobe complexes can be like soil and cob stone buildings. Adobe buildings are really resilient, and take into account many of the earliest construction this is certainly active the planet. In hot weather, compared with solid wood complexes supply extensive benefit because of their higher bulk that is definitely thermal but are considered specifically susceptible to quake damage. Complexes containing sun-dried world are common when looking at the Western Indonesia, Northern Africa, Western Africa, South America, Valencia, Eastern Europe and East Anglia

**Rammed earth:** Rammed environment is definitely a strategy included in the building itself of wall space utilizing the raw materials of Earth, chalk, gravel and lime. It's an creating that will be early that has had seen a revival in recent years as people find more constructing that will be renewable and all-natural designing strategies. Rammed planet walls are actually easy to construct, incombustible to water damage and mold. Generally, rammed earth buildings are normally found in every continent except Antarctica, from the temperate and wet regions of Northern Europe to semi-dry deserts, hill places together with the tropics. The intensity that is definitely compressive of environment may be up to 4.3 MPa. This is less than compared to an equivalent thickness of cement, but greater than sufficiently strong to use in local structures. Indeed, precisely developed rammed environment can withstand lots for hundreds of years, as many still-standing structures being historical the world testify. Rammed world re-bar this is utilizing lumber or bamboo support could prevent problems caused by earthquakes or storms that are hefty.

**Wattle and Daub:** Wattle and daub is an accomplished constructing materials used for creating walls, when a woven lattice of wooden pieces named wattle is daubed with a substance that is wet made of some mixture off damp soil, clay, sand, animal dung and straw. It is deemed a structure that will be crucial material in numerous parts of the world. The wattle is built by weaving divisions which are slim slats between straight limits. The wattle might be

made in destination to create the whole of a wall surface. Daub is generally speaking made from a mix of several ingredients from three types: binders, aggregates and support. Binders maintain the combination together and can include clay, lime, chalk limestone and dust. Aggregates give the blend their volume and dimensional stability through materials for instance earth, sand, crushed chalk and rock which is crushed. Support happens to be supplied by stew hair, hay as well as other material that is fibrous really helps to maintain mix collectively as nicely relating to regulate shrinking and offer flexibility. The daub might be combined by hand or by treading either by people or livestock it really is then put on the wattle and permitted to dry and often then whitewashed to increase its opposition to rain. Squeezed Earth locks: the soil, fresh or stable, is relatively moistened, poured into a media that is steel and then compressed either with a manual or motorized click. It really is designed from conventional rammed environment. The feedback of soil improvement allowed building greater with leaner wall space, which have a significantly Greater strength that is compressive drinking water opposition

**Squeezed Earth Blocks:** the soil, raw or stabilized, is relatively moistened, added into a click that will be steel thereafter condensed either having a handbook or motorized hit. It is formulated from traditional rammed world. The feedback of earth improvement allowed creating greater with leaner wall space, which may have a considerably better intensity that is compressive h<sub>2</sub>o resistance. Earthbag construction: this approach was created through the bunkers made by the government The development which is basic starts by searching a ditch. Lines of woven handbags (or pipes) tend to be filled with Accessible product that will be inorganic the cornerstone is laid; each consecutive layer will need more than one strands of barbed cable placed on leading. The load of the earth-filled case pushes out around the line this is certainly barbed lengths, securing the case set up along the strip below. Many kinds which is popular of consists of woven polypropylene. Organic/natural materials such as for example hemp, burlap or any other natural fiber sacks (like "gunny sacks") can be employed.

### *Stabilizer*

Some kinds soil like gravel, sand, silt on one's own just isn't stabilizers which can be dependable be added in to make them dependable. Cement, is definitely a modern stabilizer this is contemporary. It's great generally in most situations but there's usually the question of accessibility, cost, in addition the utilize that is definitely excessive of within its manufacturing, etc. Lime, on the other side hands, is constructed from exactly the same content that will be fundamental cement, it is many thousands of years outdated, is created almost anyplace, on the spot, with regard to small fraction the vitality and cost of concrete as well as a course this is certainly first for mud. Slaked or lime that will be un-slaked both acceptable but slaked lime will give significantly less difficulty within the workers fingers and foot. The number of stabilizers will depend on the standard of your land mix. Lots of mud or maybe a total large amount of Clay means a full large amount of stabilizer. Lime can be utilized between 2% and 6%. Standard developing has utilized numerous other stabilizers which can be rural as cow dung, straw, teeth Arabic and other gums and resins, sugars and molasses, tannic acid and their wastes, oil etc.

### *Mortar*

The land that had been employed for constructing wall space may be used as additionally mortar. Way too much of clay must certainly be

### **Plaster**

The conclusion of adobe, rammed cob and planet wall space is occasionally little harsh while the importance of plaster happens to be sensed. The mortar from the blocks needs to be remaining crude to act like the answer to keep the plaster, which may be of soil, or soil and any stabilizer such as for instance cow dung, lime or cement etc. pushed environment obstructs are that is soft is actually difficult in order to apply plaster on them. It is advisable to work with 2 or 3 coats of whitewash or slurry which is slim of sieved environment with lime or cement mixed with it. Coloring matter might of course be added when necessary. Avoided otherwise it shall result in shrinkage fractures. Sieve the soil whenever dry making sure that gravel and pebbles are actually all deleted for your mortar which is sleek. If stabilizers such as concrete or lime were chosen for the building of the prevents, it is also needed in the mortar. In fact double the amount stabilizer must be used during the mortar.

### *Problem definition:*

lodging desire, various methods are used by different companies and establishments (both general public facets; old-fashioned construction in Bengal can also be shifting. These improvements are actually going on within personality of kinds and connections and this can be spatial. These produced this is certainly standard keep consistently the past background together with the previously been modifying because the influences various facets like social, inexpensive, technological etc. the growth in addition to improvements of their negotiations which happen to be genuine person. The evolved types of these agreements have truly Bengal is actually a nationwide country the spot where the economy is dependent on agriculture and where the main features of Contamination of this earth in addition to the destruction for the ecosystems can also be happening with hands, the lack of revenue creation tasks in addition to the regular flooding which happen to be devastating remote areas tend to be as well as the capabilities consumers as a whole. The agreements belonging to the brand-new rooms which are urban specific country's prolonged background and countries. Vernacular architecture also subject to change over places and company in urban areas behave as pull factors for all the peoples that are remote present themselves in towns. On the other side Structure in Bengal incorporates been recently changed and changed in several situations when using the noticeable configurations of Style primarily in to the suitable areas which happen to be urbanised. Developments are generally taking place by way of the effects these days both metropolitan and contexts which can be rural. is actually hoping to be driven far from agriculture to others plus the people that are remote trying to find tasks occurring but in a very

speed that is slow area. The Hindu, Buddhist, Muslims and finally the colonists which happen to be us differences which happen to be a few In this situation you will discover a sought after of residences within the towns and cities when it comes down to populace that is enhanced. In order to satisfy the on your change in the perspective that is definitely international as to technical, climatic, socio-cultural and monetary and personal areas). Properties being developed even though it wasn't sufficient for your desire. At the same forcing regarding which are remote destinations. people live in outlying places. However, the situation is evolving. The mode of economic climate of Bengal within the improvements that are brand new since the threat towards the built ecosystem environmental characteristics in towns are actually degrading by using the overuse of natural resources. Structure of Bengal has actually eked from the geo-climate from your location while accommodating the residences go for about to lose their own acceptances which are cultural the ignorance about typical aspects. The particularly the economic, cultural and parts being ecological. Costs from the homes that are unique gotten to construction, that aren't providing an environment that will be great of the old design this is certainly regular various adverse tasks of creating markets, unauthorised negotiations etc. Having less durability other than activities regarding agriculture. Brand-new job opportunities, far better scopes for degree and conventional designs, useful design etc (Denel, 1990). rulers. Rulers in different situations attempted to implement and combine new areas of structure found in your occasion the current improvements of construction neglected to make certain some of the requirements that are sustainability societal norms and procedures of people. This design this is certainly localized sometimes known being the absorption (Mowla, 1999b). So that it needs to be analysed to see the amount of this noticeable alter is definitely competent vernacular architecture that will be continuous from rural to contexts which are urban. The researches which happen to be transported proper research structure are viewed as many of the things that happen to be big the field of studying developed Applicable tool for its evaluation of vernacular architecture, the constant issues associated adopting the tracing from the structure in remote aspects may slack some components of their durability. gradually compared to the areas which happen to be urban. It is assumed by using the obvious improvements of creating products, improvements This research is going to correct some specific issues such as, the possible lack of a during this circumstance atmosphere and for vernacular construction. Currently the scholarly reports of vernacular structure happen to be studies fail to explore the heart and soul this is certainly vernacular. with saving the results from your assessment this is useful of architecture. The documentations the design boasts some unique characteristics to sustain within that into the remote framework their culture and customs. The conventional remote construction revealed their versatility as well as like this the alteration that is contemporary, particularly in towns, are considered as too rapid for simple orienting the alterations of structure in a fashion that is definitely lasting. When you look at the make use of structure of spaces in addition the additions of new-built forms along with the comfortable residences like shops etc, the Associated with layouts in addition to the noticeable adjustments of structure are very important when it comes to investigation in present and upcoming. Residential ecosystem. Dealing with issue with the deficiency of an appropriate and approach that is clearly suitable. There is also a trouble The less importance to review the routine and adjustments of vernacular construction therefore the absence of a of responding to the context this is changing. Nowadays it's become a issue which is critical locate an means for certain community. Many decades have been residing indeed there for many centuries and having and contexts Thus, to get over these reported problems, a proper study is required to build up a style this is certainly analytical call at this field often concentrate on non-urban or framework that is definitely urban. These unintegrated and segmental Which ought to have the focus on the routine while the noticeable improvements of vernacular design in numerous occasions Changes of vernacular design together with the constant issue of distinguishing the heart features for that lasting sustainability. The design in remote areas has been evolving concurrently but in some time of globalisation It's necessary to analyse different quantities of real person settlements to track the transcendent sample.

## 2. Aim and objectives of the study:

Applicable instrument for their examination of vernacular design, the problems which happen to be continuous adopting the tracing within the Right research design are seen as lots of the ordinary things that might be huge the world of studying developed of handling the challenges, this research is carried out to get to the goals which are specific. This research is designed to ascertain the conceivable methods to conquer the study that is definitely above for any sustainability within your built environment have become the facets which are critical research. As for the objective absorption (Mowla, 1999b). So that it must be analyzed to determine the quantity of this alter that will be visible definitely capable innovations of construction. The problems regarding the lack of a good device this is certainly diagnostic the lack of vernacular structure that will be ongoing from rural to contexts which you'll find are metropolitan. The experiments which are actually sent Information about the obvious changes and habits of vernacular architecture, and above all the deficiency. this research is conducted to reach the specific objectives i.e.,

- To research a power tool that is definitely appropriate the evaluation of vernacular design.
- To analyses the design together with recognizable adjustments of vernacular design in Bengal.
- To add towards a framework which is diagnostic the evaluation of vernacular structure
- To find the heart attributes, required for sustainable planet this is local.

These objectives make an attempt to be achieved from the fieldworks and assessment with the construction that is definitely residential various periods of human beings' settlements (remote, semiurban and urban) by using a mode that is suitable for any examination of vernacular architecture.

### METHOD:

- The techniques which can be adhering to really been used in this research to manage the specified problems.
- Literature opinions for just about any understanding that is quite clear of architecture and also for choosing a suitable theory to utilize.

Literature reviews with regards to the structure of vernacular design in Bengal.

- Direct viewing of the complete situations to have a familiarity with cosmetic, practical, and proper
- features of architecture.

- Sketches and photos. The drawings are widely used to review as well as for saving the design together with modifications, in addition the well-designed connections wearing a house that will be vernacular. The photographs are actually
- useful for documenting utilization routines of the spaces, the sequences of well-designed activities,
- and differing influences those appear in the present structure this is certainly vernacular.
- Relaxed interviews of essential people. For every of the instances the member that is definitely first is known as as the person that is vital. Interviews for the users which can be aged taken fully to obtain information regarding
- different developments and modifications of this home which is certain the settlement. Some interviews in the women are used for your understanding regarding their preferences for all the useful arrangements in the properties. The literature reviews offered the goal of deciding to make the information platform on the design of vernacular design. The other methods like direct observations, interviews, and pictures are widely-used to find
- The reputation that will be present the transformations of vernacular construction when compared to the understanding standard.

It is to be noted that the use of corrugated iron as a tent in began in the early twentieth century.

How many diverse traces of culture have been connected in the rotation of time in Gahadi of. Or he has no impression of being impressed. But in the clutches of time, this impression has been erased again. Even then, some unique patterns in land design, shape, room layout, structure, decoration are scattered in the villages of. At this stage of the discussion some examples, features and construction styles of those patterns can be presented. It may be mentioned here that both secular and religious trends are equally developed in earthenware. Among the secular monuments, houses, educational institutions and mosques are the main religious monuments.

The main building material of Mud architecture is soil; This soil is basically sandy ethel. Other main constituents are bamboo, wood, straw, flax, bran and jute. However, in some places, especially in the construction of open verandas, wall coverings, etc., bricks, sand and cement are used to protect from rain or flood. Certainly, the use of bricks, sand, cement, etc. is a later effect. The use of tin in making tents is also later. Place-selection and preparation

The first condition for building a mud house is selection of high ground free from flood and waterlogging. In addition to the selection of the location of the house or house and the selection of construction materials - some of the rituals are followed. The importance of place and direction in house construction has been revealed in Khanar Bachan, Proverbs etc. Such as: The corrosion of the one who comes", "the canal of the high floor in pain. His sorrow is forever | ", "King of the South Door House. "Pub Duari" his subjects 6 Ashes at the west gate. There is no rent for the north door. " Duck in the east, bamboo in the north, surrounded in the west, left in the south, the house is full of sheep. So, a lot of time is needed. Preparations begin during the dry season and are completed before the monsoon. Although many times a two-story house is not possible to finish in one season. In particular the wall lining and coating-patch is almost always done at a later convenient time. There are a few things to keep in mind when it comes to building an earthen house. To collect two types of bamboo, wood or palm tree bark and tent material. Because it takes time to dry the bamboo in the sun and soak it in water. Land design the land design of the house is made according to the capacity and need. Usually, i houses are built around an open courtyard. Many times mud houses, especially in the 'Barendra' region, are surrounded by walls. Housing at one end of the wall and provision of livestock and other items at the other end - this is the general layout of the house. | This land design is very common for construction of one story and one room and two room houses. In the case of one room, it is square or rectangular as required. Many times, an open verandah is attached to them. However, the land design of the house is very well planned. Several types of land designs are observed in the two-story Mud architecture of the 'Barendra' region of Bengal. Most of them consist of four rooms and one more room in front of each main room.

On the second floor of such a building one or two stairs are sometimes built for decoration. In both cases the stairs are attached to the front room. The staircase is built in the middle of a room with two halls and two opposite sides of the front room. A three-room building was also constructed in the 'Barendra' region. In this case a room is built horizontally in front of the two rooms and it is used as the entrance room. If the number of stairs is one, it is in the middle of the two main rooms and if the number is two, it is connected at the two ends of the entrance room. Many times, when the number of rooms is more then the land design of the building is as long as the school. There are also archeological monuments in the 'Barendra' region with hundreds of rooms. Although the buildings differ in size, structure, land design and room layout, in all cases open verandas are attached to the front of the building. The verandah is in almost all cases covered by a shed.

Not just the main building or the house but the whole house is planned in such a way that the house is able to meet the basic needs of the affluent farmer and the joint family. Land designs of two houses can be presented as an example. One such house is in Bardhaman district of Bengal. The environment around the house is very pleasant. There are two huge ponds on the east and west side and Khal (External Court Yard) on the north side. On the northern border of Khal there is another big pond after the road and the road. Neighboring houses and jungle to the south. Ghat on the east bank of the pond. Houses and huts are slightly higher than the ground. The size of the barn is almost double that of the house. The house is built in a rectangular landscape and the main building is two stores high. The main building of the house is located on the north-east corner of the north and east sides of the land design. The main building is of English letter L (b) shape and faces south and west. The rest of the north and east arm and the south and west arm are surrounded by high fencing / enclosing wall. Inside and outside the enclosure, other structures of the house are centered around the main building. Other installations in the interior of the house include an enclosure enclosing the south wall of the enclosure wall, first a circular enclosure made of bamboo and mud to the south of the east wall and to the north-east of the enclosure; In the north-west corner, separate toilets, urinals and toilets have been constructed. In the outer courtyard of the house there were separate latrines and urinals at the eastern end of the north boundary;

On the outer side, the length of the north arm is 60 feet 6 inches and the length of the eastern arm is 36 feet 6 inches. On the inside, they measure 36 feet 4 inches and 16 feet 6 inches, respectively. The west and south ends of both arms are 22 feet wide. There are ten rooms on each floor of the main building. The rooms are arranged in such a way that another room is built in front of each main room. That is, the cells are divided into five classes, and each class is distinct; There is no corner entrance between the interclasses and there is a separate staircase for each class to go up to the second floor. This layout of the house is very much in line with the unique concept of joint family in .

Another example of land design is the land design of another house in the same district. This design is also rectangular but the house is built around two courtyards. This separation separates agriculture and agricultural related activities from the main house, so family privacy is more protected than any other house in general. The main attraction of this house is the layout of the rooms of the two-story main building. The cells are arranged in a byt shape. The house has six rooms with stairs. This type of room layout is not common in the 'Barendra' region. Probably there is no example of this in the medieval or later zamindar architecture of.

In size and structure. The size of the soil installations is determined by the economic capacity and necessity of the builder. One-room building with open verandah is the smallest size. In almost all cases, the size of the building is extended by increasing the number of rooms with two rooms with open verandah in front of the house building. The width of the rooms is always limited to facilitate the construction of the roof. This width is usually more than ten feet

. However, there is no obstacle to increase the length of the room. The size of terracotta architecture does not only increase in landmass; It is also upward. Apart from the flat roof, the pyramidal one-story building has the lowest height. The walls are usually seven feet high and the sheds above are about seven to ten feet high. If a flat roof is constructed in this Roop Bhaban, this height increases from one to two feet. In the case of a two-story building, two flat roofs are constructed and a shed is constructed on the upper flat roof. The height of the second floor is almost always lower. The ground floor is usually nine to seven feet high and the second floor is seven to eight feet high. In almost all cases, the canopy of a two-story building is pyramidal. Its maximum height on the upper roof is seven to ten feet.

The earthenware structure is built entirely of clay. Is made in the structure. Through the construction of walls on some of the soil. In most cases the width of the outer wall is greater than that of the inner wall. This size depends on the height of the walls. The width of the walls of a two-story building with a flat roof is greater than that of a single story and flat roofless building and it ranges from thirty to forty-two inches. This width of the walls gradually decreases from the foundation to the top. As a result, the entire structure is tapered and takes on the shape of a pyramid . This feature of Mud architecture is found everywhere in the Barend region. For this feature, the range of the upper room increases as compared to the lower floor room. However, for this feature, the structure tends to be stronger and more durable. This is the unique aspect of this feature. In the two-story patterns of Mud architecture, time is almost always attached to another structure. And that is: Jhul Veranda. A sliding veranda is built above the lower open veranda and parallel to the first flat roof. The veranda is mainly towards the main courtyard of the house, but in many cases, it is built in the form of an enclosure.

Roofs, windows and entrances the construction of roofs over houses and the filling of the upper part of the space between entrances and windows in walls has emerged as a major architectural problem throughout the ages. However, observing the method of construction of sheds in, it can be said that the construction of entrance, windows and roofs of Mud was not difficult. A flat roof is built over the room. The height of the roof from the 4th floor is eight feet or more. In the construction of this roof, parallel bamboos are placed at intervals of about three feet parallel to the short length of the walls of the room and horizontally cut bamboo is spread on it. The roof is then made with a two-to-three-inch layer of clay over the bamboo. The roof of the third floor is not built separately but the canopy is used. These roofs are so strong that it is possible to store hundreds of pounds of food grains on the second floor and the third floor. If not affected by water, it is used in houses from generation to generation. The gaps are filled by laying pan-shaped bash over the open space of the entrance and windows, forming the next layer of walls on top of it.

### 3. The context of mud architecture

In the early days, people did not live only in caves. Rather, people had to build shelters to survive the winter rains, to protect themselves from wild animals. There is no doubt that perishable materials were used to make it. And in this way the fragile shelter is today's sky-scraping ecosystem. The origin of architecture is also primitive. To be the oldest house of man. Which was made of locally-readily available material. The use of local and readily available building materials is a major feature of indigenous architecture. | Therefore, the geographical controller always plays an important role in determining the shape, structure, layout and nature of the architecture. At the same time, the financial capacity of the people is also affected. This style of architecture has also been published in the local or indigenous architecture of. Due to the geographical differences, various characteristic settlements have developed in different parts of. The differences in size, shape, type of tent, construction material is obvious. That difference is reflected in the cultural stratification of people that is also reflected in homes and settlements and technical skills.

Many people from both still live in mud houses. These houses are long lasting, but also a sight to behold; The decoration of the houses in the corners is very stylish, the structure is very varied, the landscaping is very well planned and the history is also very ancient and rich. Although traces of human settlements have been found in from the Stone Age, 14 Copper-Stone and Iron Age to all periods of the historical period, the shape and nature of the human habitat is not known in all cases. Patterns of dwelling houses have been discovered on its second level. The walls of the houses in their corners are made of a mixture of clay with reddish gravel and reeds; Soil has also been used to make floors. Radiocarbon (C14) method tests have shown that this settlement dates back to the 11th century BC. There are also relics of houses made of reed fences. However, there are several archeological sites dating back to prehistoric times (approximately 600 to 700 BC).

The following figures clicked by the author from a mud house village of Bishnupur ,Birsingha Gram Panchayat , block-Patrasayer, Sub division - Bishnupur, District-Bankura





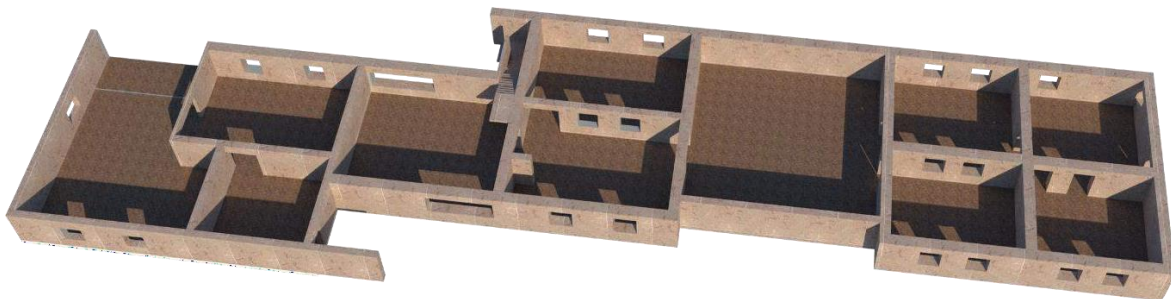
#### 4. Architectural Aspects:

**Siting:** these homes are normally determined in flat, sloped and hilly terrain. They proportion common walls with adjacent buildings. even though people in the hilly regions have been constructing this kind of mud house for plenty centuries, its time and again suffers critical harm in the course of earthquake shaking due to its heavy roof creation while separated from adjacent homes, the typical distance from a neighboring constructing is 2-4 meters.

**Building Configuration:** The plan shape of this sort of creation is usually square with lengths between 20-30 feet and widths among 10-15 feet. the primary structural elements are mud walls which convey the weight of the roofing. Many homes have open verandas at the the front with roof supported by means of posts. the opening region is about 30 percent of the full wall vicinity. the construction of doorways may be performed in methods. either by way of offering doorways with heights identical to the wall top, or bay discontinuous construction of the wall at the location of the outlet consistent with their dimension. The door frames are supplied afterwards. In case that doors are supplied with height less than the wall height, a wooden plank is provided over the opening with support of 6" on each facet. Afterwards the development of the wall is sustained leaving the hole. In case of the construction of home windows, the walls are raised as much as window sill level after which the partitions are discontinued at the location of the hole. while the partitions are raised up to the top level of the window, wood planks are again placed over the openings with assist of 6" on both facets. The last wall is built as defined earlier than.

**Functional Planning:** the primary characteristic of this constructing typology is unmarried-own family residence. In villages this form of construction can be used as go down or garage house. though maximum of the dust houses is used as unmarried-own family homes, they also can be utilized by the prolonged, mixed family relying at the homes available residing place. In a typical building of this type, there are not any elevators and no fire-covered go out staircases. In a typical constructing of this kind, there aren't any elevators and no hearth-included go out staircases. homes usually have two front doors. both can be placed either on the front side of the residence or one can be at its bottom where typically the kitchen is arranged. If homes are two-storied stairs fabricated from mud are furnished to access the top story.

**Modification to Building:** a normal modification of those homes consists in the lateral extension. Vertical extension is not very commonplace



#### 5. Structural Details:

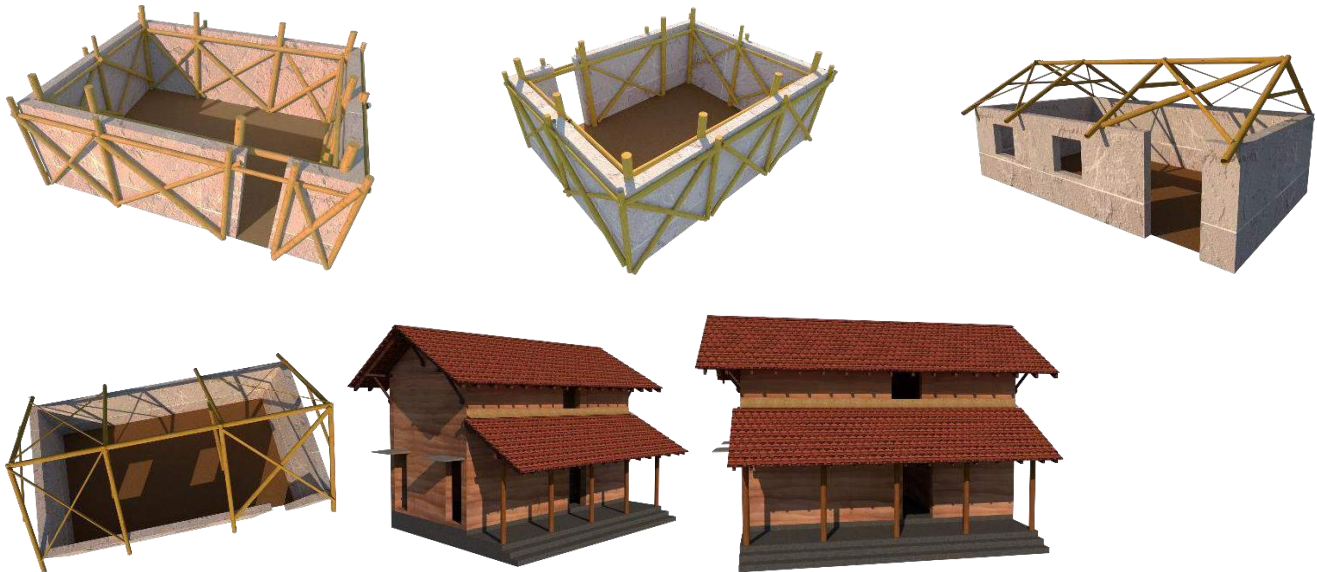
**Gravity Load-Resisting System:** The vertical load-resisting machine is earthen partitions. mud partitions bring gravity hundreds due to the roof weight and transmit them to the floor. hardly ever, wood or concrete block lintels assist in resisting the gravity loads at wall openings. mud walls are generally susceptible to immoderate rainfall, which often causes the washing away of mud from the wall.

**Lateral Load-Resisting System:** The lateral load-resisting gadget is earthen partitions. the scale of the mud walls is typically: height 3.0 m, width 4.0 m, thickness 0.50 m. The partitions do no longer have any extra device (which include crown beam or pilasters) to restrain their out-of-plane motion that's one cause why the buildings are so inclined during earthquakes. If the partitions fail in out-of-plane direction, the roof normally loses its guide and collapses. The wall corners (junctions) are very vulnerable elements of the structure. the typical wall thickness varies from 0.3 to 0.6 m.

**Use of Bamboo:** bamboo is the simplest material in construction via the advanced person of bamboo such as being bodily effective, difficult, and a low-cost material. generally, the Culm of bamboo with outer floor layer withstand strongly to any loading with more potent fracture resistance than the node. It shows that the fibers in the node do not make a contribution any fracture resistance. The tensile power of bamboo fibers almost corresponds to

that of metal. the primary discovery is that the fracture homes of bamboo depend on the origin of fracture. in the nodes, it's far determined that the average fracture longevity is lower than the minimal value of the whole Culm, suggesting that the fibers within the node do now not make a contribution any fracture resistance.

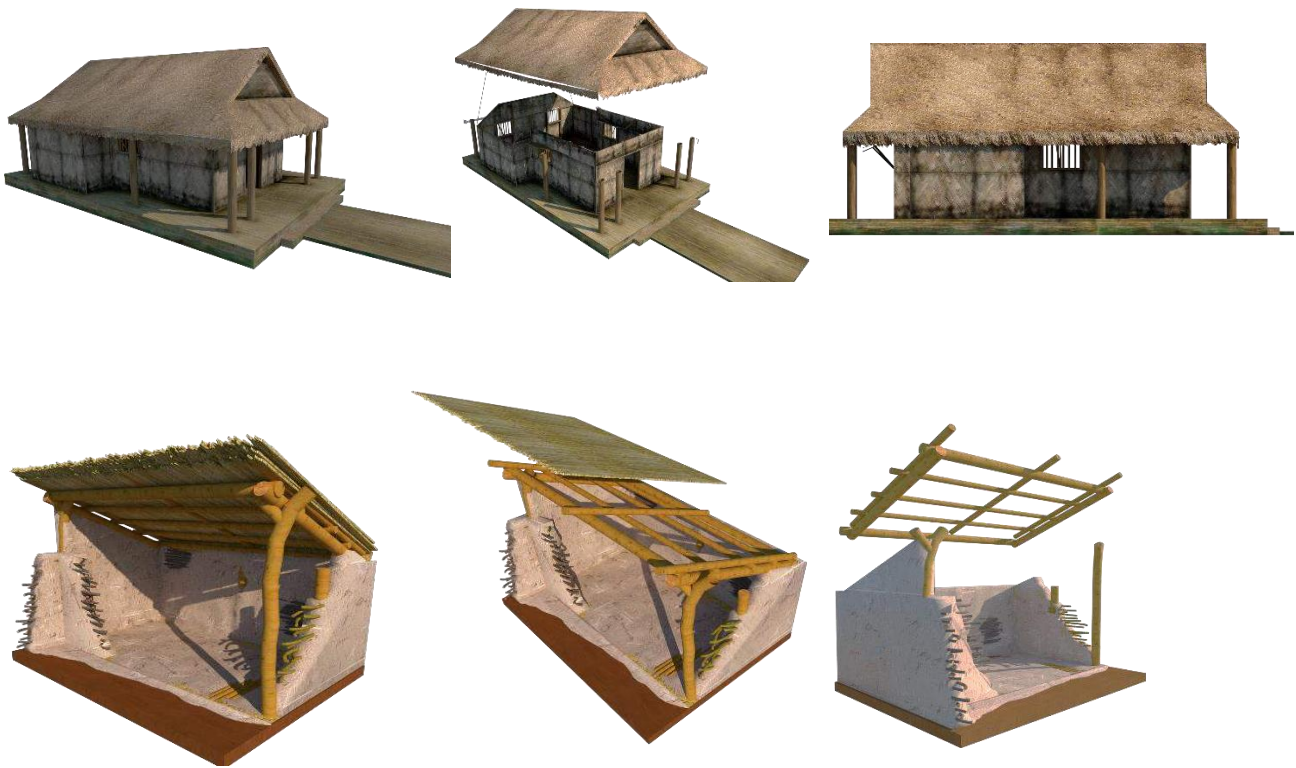
**Building Dimensions:** the typical plan dimensions of these homes are: lengths among 5 and 10 meters, and widths among 3 and 5 meters. The constructing has 1 to two story(s). the typical span of the roofing/floor's gadget is 3-4 meters. It is not easy to specify the real period and width of the residence. generally, this relies upon on the requirements in addition to on the economic situation of the inhabitants. more or less, the ratio of the duration and width of the house may be expressed as 3:2 or 2:1. The span width additionally depends at the range of participants that could occupy a single room. the everyday story height in such homes is 1.6-2.5 meters. the typical structural wall density is greater than 20 %. Generally. The ground generally consists of compacted earthen substances. Thatched roofs are very normally seen, however corrugated sheets or tiles supported by wooden purlins also can be used as roofing substances. The roofs are generally willing to facilitate the drainage of water. sometimes flat roofs with wood joists also are used. In Bengal, bamboo joists are greater common. The roofs (and walls) typically have a ten cm (4 inch) layer of straw. The compacted floor that is used as ground is typically raised 0.5-0.6 m above the existing floor stage. in the creation of mud homes no proper foundation is furnished. handiest the ground is excavated with a width same to the wall thickness and the wall is then built. commonly the wall is embedded to the ground, without footing. the overall intensity of the embedment is set 0.3-0.5m. As a end result no firm connection exists among the building and the ground. for that reason the constructing may additionally fail effortlessly due to extreme lateral loading.



#### Shed (Chala) :

The roofs of earthen buildings have to be covered with tin or straw. This covering is known as rice or shed. The number of runs is determined by the size and capacity of the building. The number of huts can range from one to several. At present corrugated iron is used in almost all cases. In the construction of tent structures, bamboo is used mainly in the case of tents made of sand or straw and in the case of corrugated iron, mainly wood and bamboo are often used. The different parts of the shed and the restraints have very beautiful names. The names of the chalas and the names of these dams also differ from region to region. The construction context is made of clay in the main structure of Mud-architecture. The soil used in the construction of the structure has to undergo some process to make the soil suitable for use. The land-design of the building planned on the first selected land is marked with twine and peg. This design is basically the foundation of the walls. The foundation is levelled and the soil is loosened by digging holes up to two-one feet deep as required. Then the water and soil have to be turned upside down with the help of spade and foot till the soil is turned into mud with water. A few days later, the relatively wet but frozen foundation is dug with a spade and the cut loose soil is mixed. At the same time the foundation is hardened by the pressure of the foot. This process of laying the foundation in the 'Barendra' region is known as jhatfela. Then wait a few days for it to dry. However, at this time the soil has to be prepared for laying the walls on the foundation. Red soil is usually used in sand-etel or red clay areas on walls with foundations. Stays. The soil is first soaked in water for a few days and then melted. Then when the water content of the soil decreases, the pulp is made by

mixing straw in the soil. The regional ('Barendra') name of melting the soil with water is Jaun (or Jaon) Fell and the name for making Monda 49 is Jaun Kacha. One and a half feet high layer is made by hand with that pulp. This layer is known as bat in the 'Barendra' region. The meaning of the word bat is part. In that sense one is part of a layer wall or bat. When the foundation is dry, the bat is given. When such a bat or layer dries, another layer is made on it and the height of the walls is gradually raised to the desired level. The width of the walls has to be taken into consideration as per the previous plan while making each layer. The width usually depends on the height of the building. This width can be up to three feet. The lower part of the walls of a two-storey building tends to be wider. If the amount of ethyl material in the clay is high, the walls will rupture during drying, so the walls are sometimes cut with a thin rope so that the walls do not rupture elsewhere. Later the cut is closed with mud in the empty space.<sup>52</sup> However, it is not necessary in the 'Barendra' region; Why don't the walls of this region usually crack. In Dhaka and its adjoining areas, it is customary to make blocks with 6 mounds prepared for building walls. Mud is used to attach those blocks. When the structure of the building is constructed, the construction marks of the walls are covered by making a clay mound mixed with straw or chaff. The two- to three-inch-thick straw and clay represent the sophisticated walls. On top of this, another layer of plain clay is applied which increases the smoothness of the walls. After that many times the walls are also coated with lime and tar. The technique of polishing the walls varies from region to region.



## 6. Decoration and Ornamentation:

### Wall painting

The practice of decorating earthen walls with kunda or painting has been going on for a long time in rural Bengal. This decoration on the wall is called wall painting in West Bengal. They are mainly found on the walls of the Santals, the largest tribal group in Birbhum, Purulia, Bankura and Midnapore. In Purulia, these murals are usually painted around Kalipujo, as this is the time when Badna Parab, a major festival of the Santal tribe, is celebrated. So at this time the people of the village repaired and renovated their old house. Since the farm will be full of grain in a few days, the motivation to decorate this house may come from the people. In this practice of mural painting, the walls are first covered with dung, and then the motifs and symbols used are inspired by nature. The bright colors are quite inconsistent with their unpretentious lifestyle.

### History

No written material relating to the source of these murals has been found. It is thought to have originated in a chain reaction. Inspired by the fact that at first a person was decorating the house with paint, gradually the neighbors also started drawing in their house. Indigenous murals have also evolved over time in a variety of shapes and sizes, depending on the way of life, economic structure, and geographical area. It varies from community to community and festival to festival. In the villages of Hura, Laxmanpur, Hatimara and Shuknibasa on the outskirts of Purulia town, murals are common.

#### Method

- Women collect different types of mud / soil. Lime soil is collected from the field. The pulp is then made with water brought from a well. The walls are repaired by mixing dung with mud. It is colloquially called 'Nikano'.
  - Once the wall is repaired, a coating of mildew or chalk is usually applied. Even when the wall is wet, various markings / motifs are drawn very quickly with the finger. After the white clay has dried, different colored designs are painted.
  - Pind, which is usually thicker than the extra part of the wall, is used as seating. It is coated with dung to protect it from rain or water. It is painted black. Sometimes white clay is also used to bring diversity. The pind itself is not a wall painting but its importance in bringing variety of colors and determining the boundaries of the canvas.
- The vocal part of the wall contains the actual canvas, where it is frescoed (painted on mud or plaster to dry it) or engraved. Since the wall itself is a huge canvas, a lot of detailed preparation is done to give it a proper look.

#### Process and material

The mural artists collect colors for their paintings from a variety of readily available, scattered, discarded materials.

Available in black tires and other dry open and straw burning straw ink.

Available in white- lime or wood, chalk or clay.

Yellow- Alay from soil or turmeric.

From red-gray soil and Alta.

Blue- From cheap blue and blue vitriol used for whitening clothes, which is colloquially called 'blue pill'.

Green- from bean leaves. Also, from the citrus plant 'Zambir'.

Tuli is made from the edges of various straw, small rags, and the fibers of the chewed tree of the local shawl or jute tree. Sometimes different designs are made with synthetic brushes or with fingers.

#### Different types

Two types of murals are common in rural huts - the first is the use of paint on the walls. After the chalk or lime has dried on the wall, various designs are painted on the wall. Among these designs are frescoes painted on the walls in white, black, blue and green with arched structures, geometric shapes and various animal and flower shapes.

Saharai walls are monochromatic most of the time. On the black ground, a layer of wet, milky-colored clay is drawn, and white spots are drawn in black with a finger or a comb. These images contain symbols of fertility that are used to celebrate mating and reproduction.

Types of engraved designs can be seen on the walls of some houses. These attractive bus-relief designs are made while building new houses. First a smooth layer of mud is applied to the wall and a border is drawn. An initial mold is drawn inside the smooth border and then a layer of mud is added. The subject is then fully expressed with the tip or finger of the bamboo. Sometimes frescoes and carvings are mixed to give the whole impression.

#### Understand the designs

Most of the motifs in Purulia's painting are taken from nature. Trees, herbs, flowers, animals, birds, fruits, and the five natural forces - the earth, the water, the fire, the air, and the sky or emptiness - are all depicted. Most of the time these signs are abstract.

#### Lotus

One of the most well-known and used motifs in Purulia's murals. There are various lotus flower motifs - some very simple, some a little intricately drawn. Many times a vine with a lotus is also painted, which means 'Tree of Life'. Through these images comes back the metaphor of the Akshaybat or the ancient tree, which survived as a symbol of invincible life in spite of all natural disasters.

#### Animals and birds

Pictures of animals and birds can be seen in the pictures of herbs. Peacock, Lakshmi owl, pigeon-pigeon, cow tiadi can be seen. Surprisingly, many of them have never seen a peacock with their own eyes, but when they see the paintings of their ancestors, they paint a new picture on their wall. Keep in mind.

#### Geometric design

Geometric designs are painted across the walls using simple squares, circles and triangles of various colors. According to many, these geometric shapes represent the five fundamental forces of the earth.

#### Motif of the soul

On the walls of some houses are seen the handprints of the family members, through which they acknowledge the idea of the soul.

Scholars say that in all these seemingly ordinary pictures are hidden the mysteries of nature's relationship with man since ancient times. Artists have to work very hard to create and paint the walls in this way. But where is the appropriate result of his hard work?

Gradually the harmony with nature is diminishing in all of us as we keep pace with modern life. This has also affected the residents of this village in Purulia. The young children of the village are no longer interested in learning or knowing these old art forms. So the number of such villages or houses is also decreasing. And maybe one day, like so many other arts, Purulia's style of painting will be lost.

No matter what material the architecture is built of, be it clay, brick, wood, stone, there are two parts to architecture: one is construction, the other is

decoration. In one structure, the other decoration. This rule has been going on since the first known history of architecture. Beauty is the natural religion of human beings. The combination of the two is due to this beauty. Before the construction of the building, when people lived in caves, tents or in thatched houses, they decorated their dwellings in different ways. ” Although generally considered, Mud-architecture is unadorned. However, the decoration of Mud is very rich and is one of the areas of rural art practice. The people of did not hesitate to introduce mindfulness in the structure and decoration of their homes because of their nature and religion.

As mentioned earlier, the main building material of Mud architecture is clay, so most of the ornaments are also completed by clay. The ornaments can be presented in three parts. Such as: structural decoration, temporary decoration and original or permanent decoration. The following is an illustration of the ornaments in this area: Structural Decorations Structural decorations are usually created for the purpose of the structure. Although sloping walls are built in earthenware for strategic reasons, it eliminates the monotony of the structure. In order to eliminate the monotony of the wall, square and rectangular panels are made in short lengths. These panels bear a striking resemblance to the panel designs of Mughal architecture. The fact that the entrances and windows are lined up for practical use in the structure also helps to enhance the beauty. The shape of any of these corners is very attractive. The arched entrance pattern collected from Dinajpur is reminiscent of medieval arched architecture. Also, the construction of the wall is what is known locally as dhari in the wall dada

Oil the style. The two construction structures in Ara add a new dimension to the decoration of Mud architecture. One of them has a covering structure and the other is a porch. The balcony expresses the aristocracy of architecture. Temporary Decoration Temporary Decoration is a unique example of the art of rural girls. Which is locally known as Lepa, Nepa, Pech Deva, Naeta, Nachna Deva. These are basically different soil coatings. The jute putli or piece of cloth known as naeta is used to cover the hands completely. Lepers have different names. The most common of these is bounepa It is basically like a semi-circular arch pattern. Apart from Bounepa, style like Konnepa, Boxnepatananepa etc. are also chosen for the coating. The design is made by pulling the stain with the tip of the finger while the coating is wet. The tip of the finger is drawn across the wall with a large patterned patch without color in the corners. The whole wall looks like a five-fingered chorus in the corner of the chorus. As there is no intensity of color, the sweetness and elegance that emerges in the depiction of this style seems to be a reflection of the real woman's mind.

In addition to these ornaments, there are examples of decorating the floor as well as the walls. These alpacas are almost always done to adorn the architecture

; Instead, it is depicted on the occasion of a festival or a special day in a corner. Alpana is still practiced on special days, especially in the Hindu community, especially in West . Most of the matifs of Alpana are herbaceous. The main color of these alpana is rice powder (rice flour). It is also used as brick powder, black ash, turmeric paste, vermilion, chalk and red clay.

In addition to these Nepa and line drawings, murals are also painted on the earthen walls. Wall paintings can be seen in Manbhum, Medinipur, Bankura, Purulia, western part of Burdwan district, Birbhum and adjoining districts of West. In particular, red and black squares are painted parallel to the white ground across the walls. In addition, the sun, lotus, iskaban and hartan signs, common leaves, flowers, birds, peacocks, mari gajhuti, shalukalta, kadam bushes are particularly noticeable among the birds. However, in the 'Barendra' region, the sign of the cross is also observed in the decoration of the houses of the Christian community.

In West and Bengal they decorate the walls irrespective of religion or caste. Another implication of these temporary ornaments is that rural girls ignore the hardships of poverty, endure the constant hardships of daily life, but at the urging of the festival, fill the walls of their house with the art of mindfulness. Is; Especially in the month of Ashwin-Kartik after the monsoon when there is less work in the family. The use of white and red clay is usually the most common as a mural color. In many cases white soil is also dipped in 'girifal' and the soil is gilded. 72 In addition, light yellow soil is also often used the walls are usually painted white and the floor is painted red. Original or permanent decoration Once upon a time, murals could be seen in almost all parts of the country.

### Gharami :

Experience of civil engineer and architect is required in architectural construction. However, the construction of Mud architecture in does not require the help of an institutionally certified civil engineer and architect. In most cases, manufacturers and housewives meet their own planning, beauty and technical needs. In , the house-building artist became known as Gharami. 65. However, in the case of short-range construction, the poor build earthen walls themselves. However, mainly professional housewives do this work. However, it is not a hereditary profession and there is no social barrier that prevents others from engaging in it or housewives from doing other work. Rather, they are a group of specially experienced people in the society who are skilled in building houses along with other works of the society. Since the house building work is seasonal, they have to be engaged in other work at other times of the year. Although they have a special place in the construction of houses, it seems that they have not been given special status in the society for ages; Financial misery does not seem to have left them behind. So maybe the proverbs like 'Gharami's house is loose', 'Gharami's house is broken, Badir's wife's constant fever', 'Gharami's matka adul (open)' etc. are prevalent in the society. A helper qualifies as the main housewife while working with the main housewife.





## 7. Characteristic of Mud Architecture:

The main feature of Mud architecture is that it is built of local materials, its construction materials are eco-friendly and unique in its habitation. Usually the manufacturer does not have to transfer cash to collect its construction materials. There is no need to be dependent on the business corner organization for corner materials. Making bricks destroys forests and pollutes the air, but earthen houses do not harm the environment in the local corner. The walls of earthenware are widened for the durability of the structure of the building. This construction style strengthens the structure on the one hand and keeps the house comfortable for living in winter and summer on the other. The hall width of Halie, another basic building style that introduces Mud architecture, gradually rises to the top. As a result, the surrounding walls give the structure of the building a pyramid shape. This style is very sustainable in terms of technology. Another positive aspect of this style is that especially in a two-story building, the range of the second-floor room is more than the lower floor. Another important feature of Mud architecture is that the architects and builders of these structures are all self-taught; That knowledge they probably derive from the school of nature. People have been preserving this ancient knowledge for generations. The epoch-making style of architecture that caters to the ecological needs of most people has given birth to the basic architectural style.

An important feature of Mud architecture is that it contributes to sustainable development. Recognized in the study of modern sustainable development. ৬৮ A two-storey earthen school building in Dinajpur district of Bengal won the Aga Khan Award in 2006. 69 Sources and Influences It is not possible to say with certainty about the architectural origins of architecture in the absence of precise information. However, the word *kath*, which is common in i as earthen wall, wall or wall foundation, is derived from the Austronesian word *kat*. ” The word *gharami* has also been identified as *desi*. In the ‘Barendra’ region, mud houses are known as ‘*kothaghars*’. The word *Kotha* is also Dravidian. This etymological interpretation of the word also relates the earthen setting to the Austronesian people who first settled in . The main descendants of the Austronesian-Sharab group. In this context, the earthen installation can be said to be based on the clay and limestone floor, earthen lining, earthen walls of the erased period of about five centuries BC, etc., mentioned earlier. Construction and technology are part of 's own culture. As of 1971, 63.4 per cent of the houses in Bengal have been covered with *bash* and soil as a covering material. Basically indigenous. That is why it is the home of the ancient nature of. Known as ‘*Banglabari*’ or ‘*Bangla-bari*’. It has greatly influenced the design of many patterns of sub-continental architecture and verandas, including.

### The report organization:

These states organized in many sections. The sections happen to be arranged in this particular series that inevitably the targets can be had. Through the opening chapter; background, problems, techniques and so the objectives are actually mentioned. The chapter this is near to define Mud architecture ' and explains the foundation plus the worldwide indicating architecture this is vernacular. The part that is third by using the technique of this investigation. The theory, technique and so the process of research are actually clarified below. The next part is actually elaborating precisely what the meaning of vernacular design in Bengal is actually, with many drawings. Part five happens to be elaborating the chosen instances along with outcomes. The chapter that is ensuing the continuation regarding the overall benefits and analyses in the instance reports. Together with chapter that will be final the Talks and recommendations for even more analysis and continuing growth of vernacular design within the situation that is definitely identified.

### Limitations:

The studies is carried out to review a our society through a focus that will be special artistic, well-designed and personal components of structure. Because these substantial researchers have offered much more consideration into the sample of architecture as well as Transformations together with the visible adjustments of routines in place of on technical aspects, therefore will likely not possess the detailed information proportions that are concerning structure techniques of construction. From the scholarly learn is definitely the treatment of the design qualities of home-based environment, extremely person households received relevance instead of a settlement this is complete. The term is actually contained by your analysis theme “Vernacular structure of Bengal” but due to the fact case researches are not constructed in a wider size so it may not be used to look for complete details about the whole of Bengal. In Bengal indeed there are many different sorts of agreements dependent upon the different geo-physical, societal features. One of them (for the cases which happen to be remote simply the flooding basic areas are picked when it comes to instances of outlying environment as it's covering greater than 80% of this land<sup>4</sup> this is utter which you'll find are characterised as strewn settlements. They Have now been examined and preferred along with some considerations<sup>5</sup> in order to express a number of the normal house forms of Bengal. These selected situations have now been receiving some fundamental tactics in regards to the salient features which can be hidden within them.

### Sense the improvement

Utilization of earth is experiencing specific downsides (Heathcote, 1995; Guettala et al., 2006; Ren and Kagi, 1995) for example significantly less

sturdiness and low compressive energy of which longevity that is reduced really been seen as a extremely component that is definitely outstanding the usage earth. A survey study used among about 150 villagers assisted to pinpoint some of the explanations which are major behind this switch in mud training that is definitely architectural. As reported by the information throughout this research, The causes behind the deviation from history with regards to constructing technology and content is generally composed switched off to a overview this is three-fold. Socio-economic elements Owing to the friendly dynamics with the growth that is outlying easy access to info and expertise submitting has actually directed folks free of their particular history guaranteed views. People from the current decades for the family members that are outlying utilized to live-in the town tend to be slowly Withdrawing his or her roots through the community to understand more about their unique possibilities into the populated city or somewhere else. The individuals which used to cultivate as a form of household which is shared right now being disconnected nuclear families with regards to households being different. Therefore, the necessity to develop the household is becoming obsolete. Moreover, the generations that are unique selecting a far more handy and long-term constructed form. The soil which is old-fashioned in the North may well be a mark of an old tradition, nevertheless the notion of it continues to be limited on the lower income people of our society. Relating to research, despite getting a prolonged and appropriate history in design, many planets which is associate Make use of with under-development and poverty (CRATERRE, 1979). In case a grouped family members can get a semi-pucca brick house, it's deemed as an achievement to their part and a symbolization of solvency in comparison to their own preceding condition. The value and option of supplies such as stone, cement, sand etc. has strengthened this pattern furthermore.

#### **Construction and routine maintenance:**

The construction means of the soil home could be time laborious and consuming. It only takes about two months for 2-3 people (120-180 person instances) to complete the construction (lodging Review, 2007). Whereas the stone residence design might take less than half of these time, together with the number which is exact same of. Variety of soil alone can be a very activity this is mind-numbing a number of points may go wrong just like choosing the form that's right of. A concrete and stone building doesn't require this work which are further. In addition, the maintenance of your mud household can be a work which is crucial. The soil walls are afflicted with prolonged shrinkage cracks, which destroy the walls. Too moisture that will be much erode away the mud wall space. Occasionally, the soil walls are generally included with protecting coat of animal dung that serves as a area that is wearing. This covering requires servicing that will be persisted sometimes restoration almost every spring. Another menacing trouble in mud houses would be the assault this is certainly infrequent of this burrow in to the soil that will be thick that makes it weak and susceptible to weaken. First and foremost, water will be the main damaging aspect in the life expectancy of a soil household. Studies also show that adobe offers very poor Mechanized properties with regards to compressive sturdiness and power in addition to inadequate Effectiveness drinking water and water attack (Degirmenci, 2008). Consequently, making use is restricted by it of mud improvements to a wonderful a lesser amount of flood area that is definitely prone lower precipitation rate. Altogether, these drawbacks have led people to the conception that mud houses are inferior to brick construction.

#### **Conclusion:**

The reality that new training doesn't provide a majority of rural people is a type of worry not only in Bengal additionally practically in most countries that are building tremendous rural demography. Offer learn has actually announced that, even though as soon as landscape this is certainly non-urban of Bengal had been dominated by different mud homes, a wind of modification has been put in place that portrays a termination that will be supreme of household someplace in the near future, caused by many unquestionable aspects at play. Launch belonging to the Rammed that is aforementioned earth Bamboo structure will not only confirm the theory and virtues of soil home but create unique also avenues towards even more analysis concentrated, framework cantered technologies required to lock in a resilient long-term for its home which is outlying in Bengal. Therefore, the specialists want to bring by themselves with the aircraft that will be exact same of over sustainability as they non-urban individuals an effort to fabricate a better foreseeable future when it comes to nation

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