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Feasibility of Cowdung Bricks as Insulator in Cavity Wall

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Abstract: *To aim of this project is to find the better alternatives for the insulation of noise and to improve the properties of cow dung bricks it was observed that the cow dung bricks fulfill the compressive strength and sound insulation Cow dung is the undigested residue of plant count which has exceeded via the intestine of goat. It is wealthy in minerals like Potassium, Magnesium, Sodium and Manganese and is constructed from natural matters. Cow dung has been utilized in India for hundreds of years with inside the fields of agriculture or farming. The approach of manufacturing conventional bricks from kiln is high priced and reasons pollution. Cow dung may be used to fabricate bricks which might be eco- friendly. Cow dung ash is acquired via way of means of drying Cow dung below sun. We used 90%, 80% and 70% of Cow dung and 10%, 20% and 30% of lime and acquired most strength. In this undertaking we're seeking to look at the homes of brick via way of means of introducing Cow dung ash. In growing countries, maximum of the populace cannot have enough money traditional constructing blocks made with the sand cement mixture. Inaddition, those blocks do now no longer offer thermal consolation and feature a excessive embodied electricity as compared to vernacular substances. The fundamental goal of this painting turned into to produce, resistant and sturdy blocks with a thermal behavior permitting first-class consolation indoor. Moreover, the great presence of fibers in cow- dung prevents the propagation of cracks with inside the bricks and therefore reinforces the material.*

Keywords: Cowdung

I. INTRODUCTION

1.1 Cavity Wall

A cavity wall is a type of wall that has a hollow center. They can be described as consisting of two "skins" separated by a hollow space (cavity). The skins typically are masonry, such as brick or cinder block. Masonry is an absorbent material that can slowly draw rainwater or even humidity into the wall. One function of the cavity is to drain water through weep holes at the base of the wall system or above windows. The weep holes allow wind to create an air stream through the cavity that exports evaporated water from the cavity to the outside. Usually, weep holes are created by separating several vertical joints approximately two meters apart at the base of each story. Weep holes are also placed above windows to prevent dry rot of wooden window frames. A cavity wall with masonry as both inner and outer skins is more commonly referred to as a double Wythe masonry wall.

1.1.2 History

Cavity wall construction was introduced in the United Kingdom during the 19th century and gained widespread use in the 1920s. In some early examples, stones were used to tie the two skins together, while in the 20th century metal ties came into use. Initially cavity widths were narrow and were primarily implemented to reduce the passage of moisture into the interior of the building. The introduction of insulation into the cavity became standard in the 1970s and compulsory in the 1990s.

1.1.3 Advantage

1. Resist wind driven rain
2. Insulation provided by slow moving air films and air 3. Enables use of low cost no rigid insulation baths

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1.1.4 Insulation

Cavity wall insulation is used to reduce heat loss through a cavity wall by filling the air space with material that inhibits heat transfer. This immobilizes the air within the cavity (air is still the actual insulator), preventing convection, and can substantially reduce space heating costs.

During construction of new buildings, cavities are often filled with glass fibre wool or mineral wool panels placed between the two leaves (sides) of the wall, but many other building insulation materials offer various advantages and many others are also widely used.

For existing buildings that were not built with insulated cavities, a fibrous material, polystyrene beads, or sometimes polyurethane foam can be installed in the cavity to reduce heat loss. The fibrous material often is cellulose insulation or glasswool blown into the cavity through suitably drilled holes until it fills the entire wall space. Although some foams used in the past, such as urea-formaldehyde, are no longer used (some people are allergic to this material, which is very difficult to remove once inside the wall), others, such as polyurethane, have taken their place.

Cavity wall insulation also helps to prevent convection and can keep a house warm by making sure that less heat is lost through walls; this can also thus be a more cost- efficient way of heating a house. About a third of the heat lost in an un insulated home escapes through its walls.

1.1.5 Issues

Breathing performance; early cavity wall buildings exchange moisture readily with the indoor and outdoor environment. Materials used for repairs must be selected with care to not affect the materials' breathing performance.

Cavity wall insulation installed in older buildings can create problems with moisture retention.

Thermal mass cavity walls are thick walls. These help stabilize the interior environment of a building better than thinner modern walls

Environmental Influences: The orientation or design of a building may affect the performance of different facades on a building. Some walls may receive more rainwater and wind than others depending in their orientation or protection to some of the faces. Moisture is one of the main problems in materials weathering.

1.1.6 What is a cow dung brick?

Cow-dung is ample because of the massive numbers of cows regionally to be had in a massive geographic location of the world. The major additives of cow-dung are plant fibres (basically composed of cellulose, hemicelluloses and lignin), amine natural compounds, and fragments of intestinal tissues. Its several properties. For this reason, it's miles utilized in pottery kilns for the firing of cooking pots. Generally, cow-dung is especially used to fertilize agricultural soils due to the fact its excessive nitrogen content material is vital for the improvement of plants. Like rammed earth or Compressed Earth Blocks. In current decades, new studies has focused on this planet as a creation cloth all through the world. In the constructing enterprise in Africa, and in particular in Burkina Faso, cow-dung is find in systems as ground coating, for stabilizing blocks and plasters, and is usually utilized in out of doors coatings to defend homes towards erosion all through the wet season.

This empirical exercise improves the water resistance and sturdiness of adobes and plasters. Very few papers cope with the consequences of cow dung on those homes (Ngowi 1997; Vilane 2010). Ngowi (1997) tested strategies of enhancing earth creation in fundamental villages in Botswana wherein cow-dung turned into historically used as a stabilizer. The creator in comparison cow-dung with different stabilizers: cement, lime and bitumen, concerning the water absorption and compressive energy. These papers basically centered on compressive energy and water absorption, being attentive to the characterization of cow-dung. In growing countries, maximum of the populace can't find the money for traditional blocks made with the sand-cement mixture. In addition to their excessive intrinsic cost, those traditional blocks do now no longer offer enough thermal consolation all through the warmest periods, and populations want to spend a pretty vital sum of money to refresh their homes. The purpose of this studies turned into to suggest an opportunity approach, primarily based totally at the valorisation of nearby substances, clay substances and natural wastes, that is higher proper to the social and financial realities of those countries. The major goal turned into to provide resistant and durable (resistance to water) blocks with a thermal consolation.

It is well known that sustainable development, one of the most important issues in the world at present days, involves to

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build our communities in such a way that we can all live comfortably without consuming all of our resources, we make an impact on the environment through how we survive our lives. In recent years, the use of solid waste derived from agricultural products as pozzolans in the manufacture of blended mortars and concrete has been the focus of researchers in the construction materials sector. The addition of ashes from combustion of agricultural solid waste

1.2 Problem Statement

It has been observed that traditional bricks from kiln is costly and causes pollution. Cow dung can be used to manufacture bricks which are eco-friendly and much cheaper. To overcome this an innovative approach of cow dung as brick ingredient and its feasibility should be checked.

1.3 Objective

1. To identify traditional ingredient of brick that will replace clay in brick.
2. To check the thermal properties of cow dung brick.
3. To check the feasibility to be used as insulator

1.4 Scope of the Project

It has been observed that massive problem of air pollution now a days so by using traditional brick as cow dung in cavity wall we can stopped the pollution formed by burnt clay. And minimizing the cement content with the help of eco-friendly construction materials, and also we create a alternative source of income for farmers.

II. LITERATURE REVIEW

1) Anisha G Krishnan, Gibi Miriyam Mathew and Sruthi G Raj et al (2017)

This paper provides the end result at the examine for using Cow Dung ash as partial substitute of cement withinside the manufacturing of concrete. This substitute became designed to examine the impact of including Cow dung ash in numerous percent with the aid of using weight (6%,8%,10%,12% and 14%) of cement. The reinforce the Cow dung ash concrete and making it extra long lasting 0.5% glass fiber is being introduced. It is an economically robust cloth, have extraordinary flexural power, crack resistance and also can use as an exchange cloth for concrete construction.

The brick making technology is driven by using the soil on-site or near to the site and then a certain amount of fibre is mixed into the soil, depending on the characteristics of the soil and then stabilized by compaction, so as to improve the engineering properties of the produced bricks.

This study is driven by the objective of making extensive use ofraw earth, containing a natural component of clayey soil, as the main building material, aided by a fibrous material which in this case is cow dung. This is to develop technologies that areenergy saving, eco-friendly and sustainable.

The scope of this study presents the fundamental investigation and procedures for the manufacture of the clay brick of which the constituents are clay, cow dung, sand, silt and water. The principal processes and procedures for forming the bricks are researched, tested, analysed and discussed and appropriate conclusions and recommendations drawn from it.

J.C. Morel, J.E. Aubert, Y. Millogo, E. Hamard, and A. Fabbri critically analyze the paper by F. Pacheco-Torgal and S. Jalali on 'Earth construction: Lessons from the past for future eco-efficient construction'. According to them, throughout the article, the authors seem to postulate that the stabilization technique is a compulsory step for earth construction. This leads to quite surprising conclusions about the cost and environmental impacts and their assumed direct link with the nature and amount of the binder used. While the question of stabilization is entirely appropriate for some applications, its routine use in industrialized countries can be questioned. Some local soils are known to exhibit sufficient mechanical characteristics without amendment. The authors are not at all against the stabilization, particularly if it is done with the real three dimensions of sustainable buildin

As the starting point of this discussion, we would like to congratulate the authors for this interesting review [1], which defends the use of earth as a building material. Indeed, while this is one of the oldest building materials in the world, it is also one of the less studied by the scientific community, and thus, one of the less understood. However, as stated by the two authors of this review, the number of scientific studies on this subject has increased dramatically in recent years. There searches on earth as a building material are mainly motivated by the growing demand of masons and construction

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companies for scientific data and evidence to evaluate and improve the wealth, the hygrothermal comfort and the seismic resistance of earth construction. First of all, we share the approach proposed by the author that consists of connecting the past and present (and even the future). This point is well illustrated by the first paragraph of the paper and its attractive title. Indeed, we think that the comparisons between the characteristics of modern earthen material sand existing ones, which have proven their effectiveness over the decades, is a major key to improve our understanding of this multi-scale composite material. The authors wish here to compare their views with those of Pacheco-Torgal and Jalali and highlight the following three main points of disagreement that justify this discussion.

2) Gautam Bhadoriya et al 2015.

Gautam Bhadoriya et al 2015.In this paper gift the experimental examine of Cow dung ash and rice husk ash as partial substitute of everyday Portland cement in M15 blend concrete. Cement became changed with Cow dung ash and rice husk ash with the aid of using weight of 5%,10%, 15%, 20% and 25% respectively in concrete. Compressive power take a look at became performed on concrete dice after 7,14 and 28 days curing. This experimental end result has most compressive power is accomplished whilst cement is changed with 5% Cow dung ash and Rice husk ash.

Throughout the article, the authors seem to postulate that the stabilisation technique (e.g., addition of hydraulic binders) is a compulsory step for earth construction. This leads to quite surprising conclusions about the cost and environmental impacts and their assumed direct link with the nature and amount of the binder used. These conclusions become even stranger if we consider cement stabilisation, which could be irrelevant from environmental, economic and technical perspectives. Indeed, if this stabilisation is efficient in the case of kaolinic clay materials containing appreciable amount

The cow dung was retrieved from eastern Namibia in the Omaheke region, namely the Rietfontein rural communal farm area. The cow dung was from the Brahman herd of cattle which is frequent in this area.

The cow dung was collected in two forms, namely fresh cow dung which had just been dropped from the animal and drycow dung which had been dropped but which was not older than 2 weeks (14 days). Both of the sample groups were described as ‘fresh’. Cows are kept for two weeks in camps and then rotated thereafter. This controlled process ensured that the correct cow dung was collected. The wet cow dung was collected by the cattle herder within minutes after dropping, wrapped in several bags which was done to ensure that the moisture content of the samples were kept as close to the original as possible by keeping the temperature low and the bacterial activity to a minimum, hence, any losses can be considered negligible. The collected moist samples were used within 5 days in order to maintain consistency.

The moist cow dung was soft to the touch (the researcher wore gloves to protect against bacterial and pathogenic infection) and was a normal faecal colour, namely dark brown with a bit of dark green.

The other type of samples was that of the dry patches collected from the ground surface which were dropped and was lying on the surface for a period not exceeding 14 days. The dung patches were fairly dry and no strong odour was detected from it. Theworms and beetles were also not noticed, although the undigested fibres were there, including additional vegetation becoming attached to the dung patches since, it fell on the ground. The urine may or may not have become part of the dung since the animals were trampling all over it.

3) O. Y. Ojedokun, A. A. Adeniran, S. B. Raheem and S. J. Aderinto

It is properly typical with the aid of using all people that concrete executes terrific duties for the development of present day infrastructures and industrialization [1]. Attempt has been made with the aid of using numerous researchers to hold the sturdiness, power and balance of concrete shape whilst additionally lowering the price of manufacturing. The cement enterprise has one of the maximum carbon footprints which makeconventional concrete unsustainable withinside the future. Materials consisting of Cow Dung Ash, Fly Ash, Slag, and Silica Fume, may be used as partial substitute for cementing cloth [2]. Cow Dung Ash is received from cow excreta that is dried with the aid of using daylight and subjected to burning as a end result, ash is received in black colour. It is cumbersome and has a huge ash content material containing a Nitrogen wealthy cloth, Potassium, Phosphorous and Calcium [3]. Cow dung is largely the rejects of herbivorous depend that is acted upon with the aid of using symbiotic micro organism living withinside the animal's rumen. Cow/Cattle are primarily located in each a part of Nigeria whilst they may be primarily rear withinside the northern states of the kingdom consisting of Plateau state, Nassarawa state, Kaduna state, Jigawa state, e.t.c. [4]. Cow dung accommodates of natural depend which include fibrous cloth that handed thru the cow's digestive system, amongst different liquid digesta that has

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been left after the fermentation, absorption and filtration, then acidified, then absorbed again. Exact chemical composition is of primarily carbon, nitrogen, hydrogen, oxygen, phosphorus, etc. with salts, cells sloughed off because the digester went thru the digestive tract, a few urea, mucus, in addition to cellulose, lignin and hemicellulose. Cow dung became habitually utilized in concrete and so one can also additionally think there had been unique blessings in its inclusion. Recent courses advocate that dung can also additionally enhance workability and sturdiness or can also additionally act as an extra binder. Knowledge has additionally been misplaced as to whether or not clean, antique or weathered dung became used. Since there's no anciental connection with the dung being antique or weathered, it's miles manageable that that is a current invention on account of present day attitudes towards odour and hygiene. In any case, dried and clean dung fluctuate especially withinside the water content material and so are possibly to have an effect on handiest the quantity of water, if any, introduced throughout blending of the concrete. This illustrates the literature of the energetic cow dung factor in concrete.

This research project presents the results on a comparative study for the use of Cow dung Ash and Wood ash as partial replacement in the production of Fly ash brick. Cow dung are often wont to manufacture bricks which are eco-friendly and far cheaper. Cow dung ash is obtained by drying cow dung under sun then burning it. Huge amount of ash generation are causing waste disposal problems. Cow dung is employed as fuel for the domestic purpose, which generates solid waste as ash. Wood ash is that the inorganic and organic residue remaining after combustion of wood or unbleached wood fiber. The physical and chemical properties of wood ash vary significantly counting on many factors. Through this study an effort was made to match the properties of the ash brick adding the wood ash and cow dung ash as a partial replacement. The method of manufacturing traditional bricks from kiln is expensive and causes pollution. Using cow dung ash and Wood ash the pollution caused by the development materials are often decreased to a far extent. We used 5%, 10%, 15% and 20% of Cow dung ash and Wood ash and therefore obtained maximum strength at 5% replacement of Cow Dung ash and 15% replacement of wood ash. Studies were done to acknowledge the properties of bricks using fly ash with partial replacement of cow dung ash and Wood ash. In this project we are trying to compare and study the effective properties of brick by introducing Cow dung ash and Wood ash as supplementary materials in the fly ash brick.

In developing countries, most of the population cannot afford conventional building blocks made with the sand-cement mixture. In addition, these blocks do not provide thermal comfort and have a high embodied energy compared to vernacular materials. The main objective of this work was to produce low cost, resistant and durable (good resistance to water) blocks with a thermal behaviour enabling quality comfort indoor. For that purpose, the effects of cow-dung on microstructural changes in earth blocks (adobes) are investigated by means of X-ray diffraction, thermal gravimetric analyses, scanning electronic microscopy coupled with energy dispersive spectrometry, and video microscopy. The effects of these changes on the physical properties (water absorption and linear shrinkage) and mechanical properties (flexural and compressive strengths) of adobe blocks are evaluated. It is shown that cow-dung reacts with kaolinite and fine uartz to produce insoluble silicate amine, which glues theisolated soil particles together. Moreover, the significant presence of fibres in cow-dung prevents the propagation of cracks in the adobes and thus reinforces the material. The above phenomena make the adobe microstructure homogeneous with an apparent reduction of the porosity. The major effect of cow-dung additions is a significant improvement in the water resistance of adobe, which leads to the conclusion that adobes stabilized by cow- dung are suitable as building materials in wet climates.

4) A. A. Adeniran

This studies task provides the end result at the examine for using Cow Dung Ash (CDA) as partial substitute in manufacturing of concrete. The experiments had been designed to examine the results of including Cow Dung Ash (CDA) in numerous probabilities with the aid of using weight (10%, 20% and 30%) of cement and remedy for the intervals of 7, 14, 21 and 28, days respectively earlier than checking out for the Compressive strengths. It additionally entails dedication of placing time, Bulk Density, and Workability of Cow Dung Ash in numerous probabilities with the aid of using blending with Portland cement. The Compressive take a look at outcomes are 21.33 N/mm3, 21.eleven N/mm3 , eleven.eleven N/mm3 and 6.00 N/mm3 for 0%, 10%, 20% and 30% substitute of cement with CDA respectively at 28 days. The Workability outcomes offers 40mm, 48mm, 80mm and 100mm respectively for 0%, 10%, 20% and 30% substitute of cement with CDA. Among the primary conclusions, it ought to be highlighted that the preliminary and very last placing time will increase as the proportion of Cow Dung Ash is introduced, (CDA) has a bonus that gives lightness of weight

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and coffee thermal conductivity, Cow Dung Ash calls for extra amount of water as the proportion will increase withinside the concrete consequently it has a critical quandary that need to be understood earlier than it's miles placed to use. Cow Dung Ash concrete is usually recommended to be used handiest whilst a 10 percent (10%) of Cow Dung Ash is introduced.

This study was conducted to investigate the significance of clayey soil bricks mixed with cow dung to construct sustainable and environmentally friendly buildings. The clayey soil was collected at about 5 km South of Okahandja and the cow dung was obtained from Rietfontein in the Omaheke region of Namibia. Analysis of all the test samples suggested that the California Bearing Ration (CBR) decreases as the amount of cow dung is increased across the entire sample. The cow dung was added as a reinforcing agent in different proportions. The compression test outcome suggests that the strengths of the bricks decrease with increasing cow dung content.

With the increasing demand for low cost housing and high cost of building material, there is a need to explore sustainable approaches to the needs of the building industry. Bricks as the core material towards construction can be produced by clay which is processed either through sun-dried or burned. The latter however is an expensive and technically exhausting whereas sun-dried bricks can be produced by the layman. In order to ensure the durability and optimal strength output with sun-dried clay bricks, fibrous materials is believed to enhance such characteristics. This study intends to explore, how cow dung can be used to enhance the quality of clay bricks that can be used for low cost building construction in various communities around Namibia.

A solution to deal with expensive building materials towards construction can be done through the use of alternative materials, such as the use of naturally occurring clay containing soil which is then stabilized to produce bricks.

The improvement of flexural strength with cow dung additions could also be explained by the contribution of short fibres contained in the cow dung In fact, fibres are rich in cellulose which is known for its good tensile strength (300500 MPa). The compressive strengths measured during this study were higher than those reported by Vilane (2010) These differences could be linked to the difference of soils used in the two studies, especially considering their clay content (the amount of clay contained in the soil used by Vilane (10 wt.%) was lower than in the sample studied here (36 wt.%)). The presence of a large clay fraction is necessary to produce the insoluble silicate amine that glues the particles together, reducing the adobe porosity. It would be interesting to compare the compressive strength obtained during the stabilization with cow-dungto that ofadobes stabilized with kenaf Hibiscus cannabinus fibres), another natural stabilizer used in Burkina Faso. The compressive strengths of the adobes amended with cow-dung present similar values to those measured on Pressed Adobe Blocks stabilized by short fibres of Hibiscus cannabinus but the values

5) Kavitha ,S.Praveen ,D Dethan, Ponny Jyoth

This study was conducted to investigate the effect of cowdung, coir and lime in strengthening of clay bricks for the construction of environment friendly buildings. There is a need to explore sustainable approaches to building construction with the increasing demand for low cost housing and the high cost of building materials. Bricks which are the core material in building construction are made from clay, which is processed either by sundried or burnt. Coir is a abundantly available natural fiberand is extracted from the husk of coconut fruit. In the work, coir is used to act as reinforcement in the ratios, 5% and 10%. Mixing cowdung to clay improves plasticity, reduces green breakage, and act as internal fuel in fire bricks thereby reducing firing cracks. The various ratios of cowdung used are, 5%, 10%, 15%, 20%, 25%. In good brick material a small quantity of brick not exceeding 5% is desirable. Lime prevents shrinkage of raw bricks.

Bricks are the small rectangular blocks typically made of fired or sundried clay. These bricks are obtained by moulding clay in rectangular blocks of uniform size and then they are dried and burnt. At places where stones are not easily available and if plenty of clay is available, the stones can be replaced by the clay bricks. Being uniform in size, they can be well arranged, and also does not require any heavier lifting mechanisms are they are light weight. The art of laying bricks is simple that it can be carried out with unskilled labours also.Clay bricks are the first man made artificial building material. They possess greater fire resistance than stone and concrete masonry. Clay bricks are a significant basic material of construction required in all spheres of constructional activities and it constitutes about 13% of the total cost of building materials. The use of clay bricks provides a comfortable physical living environment than the use of other material

The demand for clay bricks have been increasing year by year with increase durbanization, growing population industrialization etc., in both the private and government sectors. A significant change have been taking place in the

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building habits that, there is a common tendency to shift from traditional housing types to RCC type houses which make use of bricks for construction. Thus the demand for bricks is registering a steady and significant growth over the years. This situation along with the demand for low cost housing and high cost of construction materials has lead to several investigations to develop light weight and cost effective bricks for constructional activities. The normal bricks are made from various type of clay such as, surface clays, shale clays and fire clays. In the study conducted, cowdung, coir and lime is used along with clay to manufacture clay bricks, which have the desirable light weight properties and which is also cost effective.

Addition of cowdung to clay modifies the properties of clay which results in better brick qualities when compared to other organic waste additives. Cowdung improves the plasticity of clays and reduce green breakage and also act as internal fuel in firing bricks thereby reducing firing cracks. But excessive content of cowdung reduces strength and density. The best ratio for addition is 20% to 30% that gives the desired properties fora brick. Along with the improvement of plasticity, cowdung also act as a reinforcing agent which reduces concentrated cracks. The dung fibre ignite upon firing, thereby assisting in even firing of bricks and minimize the development of high temperature gradients. When fibers are burnt out, it leave cavities within the brick which reduce the unit weight and improve thermal characteristics. When the bricks are laid in mortar bed, the cavities present on top and bottom surfaces of the bricks increases the bond.

III. METHODOLOGY

3.1 Structure of the Cavity Wall

3.1.1 Scale Structure

Assume the scale as 1m X 1m as per the structure.

Procedure

Firstly, lay out the bricks at both ends of your wall where the pillars will start. This should be done after any necessary foundations have been prepared. Using your string line, make a straight guideline at brick height between the two outside bricks following this, heap five shovels full of sand and one of cement on an old board. Turn shovel to mix to a consistent colour. Form a central hollow, pour in water and mix. Repeat for a smooth, creamy texture that's wet but not too loose. ext. you should lay a 1-2cm mortar bed along the string line. Starting at one end, lay the first brick and tap slightly to 'bed in'. 'Butter up' one end of the next brick with mortar and abut it to the first.Repeat using string line as a guide. At the point where you want your pillars to start, place a brick side-on to the end of the wall. As you build up the wall, each consecutive course of pillar bricks must be laid in the opposite direction. When building pillars, at certain courses you'll need to lay half-bricks. To make a cut, place the brick on its side, locate the bolster at the split point and strike the head firmly with a club hammer. It should split cleanly first time. Always build at least a course higher on the pillars than the rest of the wall. Move the string line up as you build, bedding it into the mortar on the pillars. For a stretcher bond, the end of each brick should be over the center of the one beneath.

Fig 1. Structure of Cavity wall

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3.2 Construction of Cow Dung Brick

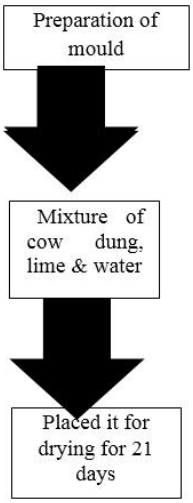

Fig.1.1 Mixture of cow dung, lime & water

Fig.2 Cow dung brick

3.3 Preparation of Mould

Preparation of Mould of standard size as per Indian standard ie, 19cmx9cm9cm.With the help of standard size mould we have to prepare a sustainable Cow dung bricks.

Fig 3: Mould of Size 19mmX19mmX9mm

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3.4 Ingredient Used to Make a Bricks

3.4.1 Cow dung

Cow dung may be used to fabricate bricks that are green and lots cheaper. Cow dung ash is received through drying Cow dung beneath Neath sun. Cow dung, additionally referred to as cow pats, cow pies or cow manure, is the waste product (faces) of bovine animal species. Cow dung is the undigested residue of plant depend which has surpassed thru the intestine of goat. It is wealthy in minerals like Potassium, Magnesium, Sodium and Manganese and is created from natural matters. Cow dung has been utilized in India for lots of years with inside the fields of agriculture or farming. The technique of manufacturing conventional bricks from kiln is luxurious and reasons pollution.

In growing countries, maximum of the populace can not manage to pay for traditional constructing blocks made with the sand-cement mixture. In addition, those blocks do now no longer offer thermal consolation and feature a excessive embodied power as compared to vernacular substances. Cow dung, which is mostly a darkish brown color, is regularly used as manure (agricultural fertilizer). Dung can also be accumulated and used to provide biogas to generate energy and heat. The fueloline is wealthy in methane and is utilized in rural regions of India and Pakistan and some other place to offer a renewable and stable (however unsustainable) supply of energy. In primary Africa, Maasai villages have burned cow dung internal to repel mosquitos. In bloodless places, cow dung is used to line the partitions of rustic homes as a reasonably-priced thermal insulator. Most of villagers in India spray clean cow dung combined with water in the front of the homes to repel insects. It is likewise dried into cake like shapes and used as alternative for firewood. Cow dung is likewise an nonobligatory element withinside the manufacture of adobe dust brick housing relying at the availability of substances at hand. Cow dung ash has chemical residences wealthy in Nitrogen, Potassium and calcium. It has exceedingly excessive carbon to the Nitrogen ratio. While it has bodily residences inclusive of it's far bulky, has big ash content material and burning ratio is low. The cow dung is uncovered to daylight to dry. The dried cow dung is hard it is then beaten into quality powders which are then subjected to burning after it is dried to have goat dung ash which is obtained in black color. For the manufacture of brick the cow dung is uncovered to daylight to dry, after which beaten into quality powder this quality powder is blended with clay in distinctive percentage. The earth used is taken for the brick production company.

3.4.2 Chemical Composition of Cow Dung

In concrete is being a recurring practice because of the pozzolanic pastime of the ashes in the direction of lime. One of the maximum thrilling substances is the ash received from the combustion of sugar cane strong wastes. Several tries had been made to lessen the growing value of cement manufacturing in growing countries with very little success. There is the need to are seeking for alternative to conventional cement and to seriously take into account the utilization of industrial and agricultural via way of means of-merchandise as feedstock for the cement enterprise to provide mixed cement. Utilization of a number of those via way of means of merchandise as partial alternative of cement further to enhancing the houses of concrete additionally generates income (via sales) and Employment. The trouble of disposal of those via way of means of-merchandise is minimized and the quantity of inexperienced gases launched into the environment via cement-manufacturing techniques is likewise substantially reduced. Cow dung Ash is received from goat excreta that's dried via way of means of daylight and subjected to burning as a result, ash1 is received in black color. It is bulky and has a large ash content material containing a Nitrogen rich material, Potassium, Phosphorous and Calcium. Cow dung is largely the rejects of herbivorous matter which is acted upon via way of means of symbiotic bacteria residing within the animal's rumen. Cow dung is composed of organic matter including fibrous material that handed via the cow digestive system, amongst different liquid digestive that has been left after the fermentation, absorption and filtration, then acidified, then absorbed again. Exact chemical composition is of on the whole carbon, nitrogen, hydrogen, oxygen, phosphorus, etc. with salts, cells sloughed off because the digester went via the digestive tract, a few urea, mucus, as well as cellulose, lignin and hemicellulose. Cow dung became habitually utilized in concrete and so one may also think there have been precise advantages in its inclusion. Recent guides endorse that dung may also enhance workability and sturdiness or may also act as an extra binder. Knowledge has additionally been misplaced as to whether or not clean, vintage or weathered dung became used. Since there's no anciental connection with the dung being vintage or weathered, it's miles attainable that that is a current invention as a result of current attitudes in the direction of odour and hygiene. In any case, dried and clean dung range specifically within side the water content material and so are possibly to have an

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effect on best the quantity of water, if any, brought at some point of blending of the concrete.

LIME

Lime is a calcium-containing inorganic mineral composed on the whole of oxides, and hydroxide, commonly calcium oxide and/ or calcium hydroxide. It is likewise the call for calcium oxide which happens as a made from coal-seam fires and in altered limestone xenoliths in volcanic ejecta. The phrase lime originates with its earliest use as constructing mortar and has the experience of sticking or adhering. The rocks and minerals from which those substances are derived, usually limestone or chalk, are composed on the whole of calcium carbonate. They can be cut, crushed, or pulverized and chemically altered. Burning (calcinations) of those minerals in a lime kiln converts them into the rather caustic cloth burnt lime, unslaked lime or quicklime (calcium oxide) and, via next addition of water, into the much less caustic (however nonetheless strongly alkaline) slaked lime or hydrated lime (calcium hydroxide, Ca(OH)2), the manner of that is referred to as slaking of lime. If excessive compressive strengths are undesirable, lime content material may be elevated and the belongings specs used.

Fig 4: Hydrated lime

The use of lime in cow dung contributes to the durability of this system. The durability of lime is evidenced as follows

- Elasticity - Research has shown that high lime content was slow hardening and remained elastic or flexible. Lime, therefore, enhanced the ability of the assemblage to accommodate stresses caused by structure movement and cyclical changes without excessive cracking.
- Autogenously Healing - When hairline cracks develop in the brick, hydrated lime reacts with carbon dioxide in the atmosphere. This reaction produces limestone which helps to seal the crack.

Chemical Composition Compound Name Percentage (%) Composition

1. Calcium oxide CaO 74.23
2. Phosphorus oxide P2O5 0.08
3. Magnesium oxide MgO 0.74
4. Calcium sulphate CaSO4 0.12
5. Ferric oxide Fe2O3 0.17
6. Aluminium oxide Al2O3 0.11
7. Silica SiO2 0.14
8. Loss on Ignition LOI 24.35

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CHEMICAL COMPOSITION	COMPOUND NAME	PERCENTAGE (%) COMPOSITION
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4) Calcium sulphate	CaSO4	0.12
5) Ferric oxide	Fe2O3	0.17
6) Aluminium oxide	Al2O3	0.11
7) Silica	SiO2	0.14
8) Loss on Ignition	LOI	24.35

Table 1: Chemical Composition of Lime

Soil

There are many varieties of soils from which bricks are made. The maximum appropriate ones are sturdy soils, sandy soils and calcareous soils. Strong soils are plastic in nature and include fewer establishing spaces (voids). On drying, the water content material of those soils comes out with pressure, thus, cracks are fashioned both within side the soil or the goods solid out of them. Sandy and loamy soils are taken into consideration correct soils for making bricks. Soils containing as little as 17 in steps with cent clay content material will also be used.

Calcareous soils containing up to one in step with cent of CaCO3 do now no longer gift problems in making correct-first-class bricks.

Fig 5: Soil

Calcareous soils contain some lime which gives the soil a light colour. Excess of lime causes lime-bursting in the bricks. The red colour of bricks is due to the existence of Fe2O3. MgO gives a yellow colour. A soil which has 25 percent Al2O3, 55 percent SiO2, 20 percent Fe2O3, MgO and oxides gives the best bricks. Soils having the following composition and characteristics are considered suitable for bricks also.

Clay: 20 - 30 percent; clay and silt: 40 - 65 percent; liquid limit: 25-38 percent; volumetric shrinkage: 15-25 percent; and plastic index: 7-16 percent.

Grass Content in Cow dung

The Tensile strength is increased when the increase Grass fibres content in cow dung. With increasing in the percentage of the Grass fibre of compressive strength of the brick is increase and water absorption is decrease.

3.5 Procedure

a) Drying cow dung

Cow dung Ash is obtained from goat excreta which is dried by sunlight and subjected to burning as a result, ash is obtained

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in black color. Bio Slurry (Cow dung/Poultry) contains a lot of water. Moisture content range is (10 - 20) %. As a result we need to remove the excess water content so that proper reaction takes place between cow dung and hydrated lime. Cow dung dried till complete turns to dryness that is complete moisture content should be removed and cow dung powder should prepared.

Fig 6.: Drying of Cow dung 1

Fig 7: Drying of Cow dung 3

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Bricks are made from Cow dung lime and sand. Where available, silt (very fine particle material) will increase the range of particle sizes and strengthen the mixture The proportions of these materials can vary considerably. But a good mixture to begin with would include:

7 parts cow dung (70%)
2.5 parts of lime (25%)
0.5 parts of sand (05%)

Fig 8: Mixture of Cow dung

So the share of this fabric for making of Bricks has to be taken into consideration as (70:25:5).
Make a few take a look at on bricks after which modifies the proportions as vital. Some matters to maintain in thoughts at the same time as experimenting with one of a kind proportions: - Silt have to in no way be extra than 15% of the aggregate; -A wholesome quantity of sand is vital to maintain the clay from shrinking. On the opposite hand, an excessive amount of sand makes the aggregate watery and weakens the bricks as they dry.

3.6 Process of Brick Making

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3.6.1 Mixing Materials

Use a mixing platform as Measure out and mix the proportions and add water slowly: No large stones or lumps can be left in the mixture.

3.6.2 Mould's

The most common adobe brick mould has a nominal size of 20cm x 10cm x 10cm. It is made with a bottomless mold or with bottom with actual inside dimensions of 19cm x 9cm x 9cm.

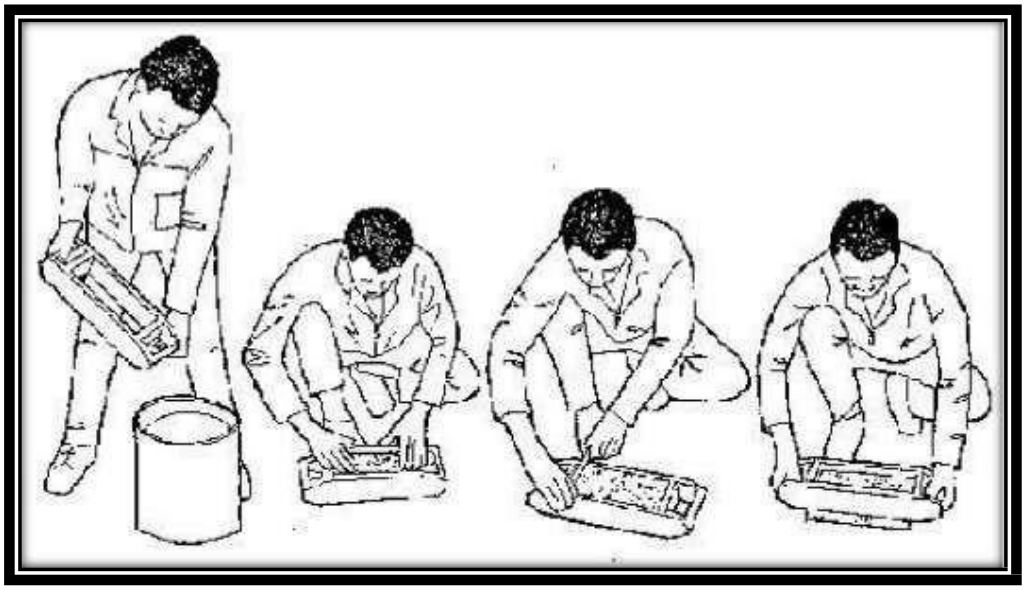

Fig 9: Team Work

Gently place the mold on flat ground, close to the last brick made. Let it sit for a few moments, then lift the mold up slowly.(As shown in fig below)

Rinse the mold off thoroughly (in a barrel of water) before making another brick with it.

Fig 10: Moulded Bricks

3.6 Curing

Bricks must be dry before they can be used; if they dry in the wall they will shrink and ruin the mortar bonds. The bricks should dry in the sun for about 30 days. For the first week or so, the bricks should be protected from rain. Sheet metal

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provides a good protective cover. After the first week they can be safely exposed to light rainfall. Turn each brick over every 5 or 6 days to assure even drying.

3.7 Fill the Cavity Wall with Cow dung Brick

As Per the Information We filled the Cow dung Brick in the Cavity Wall and then We Perform the various test on the Structure.

Fig 11: Cavity Wall Filled with Cow dung Brick.

3.7 Test on Structure

3.9.1 Temperature Test

Temperature Test on Structure carried out to determine the Indoor Temperature or Outdoor Temperature in Cavity wall with Help of Thermostat thermostat, device to detect temperature changes for the purpose of maintaining the temperature of an enclosed area essentially constant. In a system including relays, valves, switches, etc., the thermostat generates signals, usually electrical, when the temperature exceeds or falls below the desired value.

Fig 12: Thermostat

We Observe the Reading Before Insert Cow Dung Brick and After Insert the Cow dung Brick then We Notice the Temperature are varied

3.9.2 Sound Test

Sound Test on Structure carried out to Determine the Frequency in Indoor or outdoor with the help of dB Meter application in the help of Mobile phone. We observe the reading before Insert Cow dung Brick and After Insert Cow dung Brick . then We notice the Sound Frequency also be Varied

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Fig 13: dB Meter

IV. EXPERIMENTAL ANALYSIS

SR NO	Activity	Time frame (Days)
1	SELECTION OF TOPIC	23
2	FINALIZATION OF TOPIC	04
3	LITERATURE SURVEY	32
4	Construction of Cavity Wall	05
5	MAKING OF MOULD	02
6	SELECTION OF MATERIAL	08
7	SELECTION OF PROPORTION	06
8	MAKING OF BRICK	04
9	DRYING OF BRICK	21
10	CONDUCTING OF PRELIMINARY TESTS	01
11	PAPER PUBLICATION AND FINAL REPORT OF PROJECT	50

Table 2 Planning and Scheduling

Temperature Effect & Importance of Cow Dung Brick

We all realize that human can stay with consolation at a temperature among 20- 25°C, however right here in India Specially in North we've got summer time season for greater than eight months and wintry weather in last four months. But sadly all our gift constructing fabric like steel, cement, stone dirt and pucca bricks are appropriate conductor of warmness, ensuing our constructing take in warmness in summer time season days and launch it at night time that is our napping time and vice-versa in wintry weather. Our constructing will become heated chamber in summers and chilled fall down winters. Presently we don't use any thermal insulator in our constructing. To fill this hole and to accurate this mistake in our cutting-edge constructing substances and era we're introducing Vedic Plaster, that is a gypsum primarily based totally cow dung plaster with a few miner additives. We all realize gypsum and cow dung are inexpensive and quality thermal Insulator and human used it in homes from time unknown. Gypsum has been utilized in pyramids and historical church buildings and has lifestyles in heaps years. Progress of individual is without delay associated with development of cows and different cattle. We ought to connect cow once more with cutting-edge economy. Think once more why our ancestors lived in cottages plastered with cow dung. Cow dung is most inexpensive and quality thermal insulator, enzymes found in cow dung are appropriate binder, cow dung has antiseptic residences and additionally prevents from radiations. Cement concrete has absolutely removed cow dung from our buildings. Cow dung additionally

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prevents harm to plaster because of salts and humidity. No civil engineer, architect or indoors fashion dressmaker will inform you this due to the fact they're now no longer taught approximately cow dung. "Buildings throughout the globe devour 60-70% of the full power generated and are a prime contributor to the greenhouse gases. The most proportion of this power utilization is in conditioning (heating or cooling) the constructing interiors. In India, which has a tropical climate, insulation of constructing envelope might bring about main power saving and minimizing the greenhouse fueloline emissions which might make contributions to a inexperienced and sustainable development." Vedic Plaster is a gypsum primarily based totally cow dung plaster which insulate constructing. So use Cow dung Brick, Plaster to shop power and surroundings and assist to defend our climate. The unmatchable residences like a herbal air purifier, thermal insulator developing a temperature distinction of 10-15 degrees, pollutants manipulate measure, radiation evidence quality, etc.

Fire Resistance Test

We have burnt our brick for 15 minutes it does not get fire easily but after 1 hour it turns to ash. So it is less fire resistance as compared to normal brick.

Fig 4.23: Fire Resistance Test

V. EXPERIMENTAL RESULTS AND TABLES

5.1 Temperature Test Results

Sr.No	Observation	Readings
1	Before Cow dung Brick	32°C
2	After Cow dung Brick	31.1°

Table 3: Temperature Readings

Fig 14: Outdoor Temperature Readings

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Fig 15: Indoor Temperature Measure

Fig 16: Indoor Temperature Readings.

5.2 Sound Test

Normal Outdoor Reading Sound Frequency: - 58dB

We Observe the Readings without cow dung Bricks.

Sr. No	Observation Points	Readings
1	PA	75dB
2	PB	77dB
3	PC	82dB
4	PD	79dB
5	PE	75dB
6	PF	85dB
7	PG	83dB
8	PH	79dB

Table 4: Before Insert Cow dung Brick

Sound Test with Cow Dung Brick in Structure

We Fill the Cow dung Brick in Structure or observe the readings what difference with cow dung brick or without Cow dung Brick.

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Sr. No	Observation Points	Readings
1	PA	73dB
2	PB	72dB
3	PC	77dB
4	PD	76dB
5	PE	72dB
6	PF	81dB
7	PG	83dB
8	PH	75dB

Table 5: After Insert Cow Dung Brick

VI. CONCLUSION

Cavity Walls give Good Insulation against Sound, it makes the room Soundproof Cow dung brick with 65% cow dung (mix 1) gives adequate strength. As the Cavity or Gap between the two leaves is filled with air which is a poor conductor of heat, the transmission of heat, the transmission of heat inside the room is reduced it makes the room heatproof. The weathering is also significantly reduced. Weight of cow dung brick is less than the normal brick, so it reduces the dead load of building. (As compared to conventional brick 85% of the total dead load is reduced in case of cow dung wall). Cow dung brick is not fire resistant. The strength of the soil cow dung mixture decreases as the percentage of cow dung content increases. This brick is environmentally friendly. Health wise also it has a lot of benefits.

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APPENDIX

Mixing Ingredients

Construction the Structure

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Cow Dung Brick

Cow dung brick in cavity wall

Group Photo