"ANALYSIS OF THE COMPARATIVE PERFORMANCE BURNT CLAY BRICKS AND COMPRESSED STABILIZED EARTH BRICKS, Case Study is located in MUSANZE District/ RWANDA" Simplice MUNYAGATENZI.

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**ABSTRACT**

- Rwanda is a country of one thousand hills. This project entitled “ANALYSIS OF THE COMPARATIVE PERFORMANCE BURNT CLAY BRICKS AND COMPRESSED STABILIZED EARTH BRICKS“ will be resolved by existing problem in construction industries from country even in great lake region. Many institution company has no choice about construction material selection in terms of specification document thus work will provide more information to the bricks as most usable material in construction brick work laying.

- This has created opportunities for developing many alternative masonry materials that can be used for wall construction. Compressed stabilized earth bricks, solid blocks and interlocking blocks are few such materials.

- To reduce the number of bricks used in given area, rat-trap bond is also gaining popularity in order to investigate comparable performance.

**Keywords:** construction materials, selection site, specification document, brick work, gradient of soil, the software, stabilised earth brick, solid blocks, load and burnt clay brick.

**GENERAL INTRODUCTION**

- Masonry construction is very common in the housing industry all over the world. It has many advantages such as single element fulfilling several functions including structure, fire protection thermal and sound insulations, weather protection and sub-division of space while having high durability that allows long years of service.

- This part covers two varieties of burnt clay bricks and different types of compressed earth blocks used as masonry units. The structure performance of such units will be assessed with strength parameters. The focus will be also placed on different masonry bond patterns with the selected units and the structural performance which will be assessed.
by testing wall panels. When alternative masonry materials are considered, two materials have gained popularity in the recent time among house builders. They are compressed stabilized earth bricks and interlocking blocks. These bricks can be manufactured to the standard brick size of 215mm x 105mm x 65mm. The blocks can be manufactured as solid or interlocking.

- The prevailing shortage of many building materials based on natural resources has led to a considerable price escalation in recent times.

- **Case study plotting map** musanze district.

- Compressed stabilized earth bricks, solid blocks and interlocking blocks are few such materials. To reduce the number of bricks used in given area, rat-trap bond is also gaining popularity. All these will create many challenges to the professionals involved in the building industry that have to be solved by providing data on strength and behavior.

- Molding clay brick manufacturing and compressed block.
PROBLEM STATEMENTS

- Fired Clay Brick making in their production and transport must be emphasized in accordance with the Building Code.

- One of objectives of Government of Rwanda is to encourage peoples to participate in environmental management during construction activities in order to promote development of our country.

Objective

- The main objective is carryout structural the analysis of the comparative performance burnt clay bricks and compressed stabilized earth bricks.

- A project attachment is very crucial for every student before graduating as it appears on the schedule of the academic activities of IST Burkina Faso.

- My project will helpful the growth of construction development in country and worldwide construction. Some engineering companies need skilled people to accomplish the test with high quality so my project will teach people how bricks prepared and its quality then they will choose according to the type of work size of project function of building.

THE RESEARCH QUESTIONS

- This study addressed the following research questions:

- Does a real important to identify and analysis compressive strength of bricks consisting of burnt clay bricks; stabilized earth clay bricks and blocks?

- Is there the different in weather resistance between burnt clay bricks and stabilized earth clay bricks and blocks (Interlocking bricks or blocks)?

- Does a really participation exist in this research project in environmental management in Rwanda?

- How this research will contribute in developmental activities of our country and surroundings countries?

- Does a real important to indentify and analysis of strength of bearing capacity and self drain through infiltration from sock pit to environment.

- This research project will participate in environment.

- Country Layout plan view.

Legend

- parks_rw92
- lacs_rw92
- Kivu_lake_rw92
LIMITATIONS

The study committed by insufficiency of finance needs finance to implement the plants that will produce the product with good standard as our study shows the issues of accommodate infrastructure just to keep on the plant and stores during execution of project and therefore the construction industry limitation of this study will be mainly the one of associated to subjectivity and feeling of responses where respondents will be viewed the research as forward exercises and purely academic work; hence they will give responses without fact and evidence. On other hand respondent could fear to exhaust the required information.

LITERATURE REVIEW

DEFINITION OF BRICK.

Brick is defined in the Encarta English Dictionary (2009) as a rectangular block of clay or similar material (i.e. laterite) that is baked until is hard and is used for building houses, walls or other permanent structures.

METHODS AND PROCESS

The process of manufacturing of bricks from clay involves preparation of clay, molding and then drying and burning of bricks. The bricks are building materials

Site selection for manufacturing of bricks

some important considerations such as:

The ground should be of plain surface.

The site should be connected with communicating roads for transporting materials etc.,

Good brick earth should be easily available.

The site should offer all facilities to the workers.

Manufacturing process of bricks; there are four different operations are involved in the process of manufacturing of bricks:

Preparation of clay

Molding; Drying and Burning

Preparation of clay for brick manufacturing:

Preparation of clay for bricks manufacturing is done in six steps: Unsoiling of clay we need pure clay for the preparation of bricks. The top layer of soil unsoiling. Digging After the removal of top layer, Cleaning In this stage, the clay is cleaned of stones, vegetable matter etc. then the clay is washed and screened. The lumps of clay are converted into powder with earth crushing rollers. Manufacturing of Bricks - Clay Preparation
Molding of clay for brick manufacturing

- In the molding process, prepared clay is mold into brick shape (generally rectangular). This process can be done in two ways according to scale of project.

  - Hand molding (for small scale)
  - Machine molding (for large scale)

Hand molding of bricks

- If manufacturing of bricks is on a small scale and manpower is also cheap then we can go for hand molding. The molds are in rectangular shape made of wood or steel which are opened at the top and bottom. The longer sides of molds are projected out of the box to serve it as handles. If we take durability in consideration steel molds are better than wooden molds. In hand molding again there are two types and they are Ground molded bricks and Table-molded bricks

Ground molded bricks

- In this process of ground molding, first level the ground and sand or ash is sprinkled over it.

- Now place the wet mold in the ground and filled it with tempered clay and press hard to fill all corners of the mold. Extra clay is removed with metal strike or wood strike or with wire.

- The mold is then lifted up and we have raw brick in the ground. And again wet the mold by dipping it in water and repeat the same process. The process of dipping mold every time to make bricks is called slop molding.

- Sometimes, the inside surface of mold is sprinkled with sand or ash instead of dipping in water this is called sand molding and Frog mark of bricks are made by using a pair of pallet boards. Frog mark means the mark of depth which is placed on raw brick while molding. The depth may be 10mm.

- INTERLOCKING BLOCK

  - The dry stacked interlocking block masonry replaces the conventional brick and mortar construction masonry by interlocking blocks masonry construction. The other components of the conventional building system remain largely unchanged.

  - The system is a dry stacked Interlocking masonry but can be done with mortar/slurry/grout also that enables aesthetic and affordable building, speedier construction of high quality in stretcher bond, and as well as in the normal English/Flemish bond with mortar. The blocks have an extremely appealing face brick/wash finish and provide a pre-pointed straight masonry. The walls may be left exposed, plastered/rendered or finished with cement wash.
The system has originated during the time of Egyptian pyramids construction and may be even before that period, and has extensively been in use over different continents. A number of constructions have been made using interlocking building system in India over last decades.

The interlocking block masonry system is not uniform in India, and as per information available with the author, there are three types of interlocking blocks available (as per information available with author) in India:

**INTERLOCKING MASONRY FEATURES**

**Interlocking Block**

blocks are not laid on mortar but can be laid with cement slurry, they rely on the interlocking mechanism to provide resistance to applied loads. Dry stacking results in reduction of building costs due to saving in construction time, reduced requirement for skilled labour and costly material especially cement and reusability of the blocks.

**Figure view of the block**

The usage of unskilled labour makes dry stacking particularly attractive when compared with masonry with use of mortar.

**CORNERS**

Corner requirements are: Shaved ½ blocks is prepared. It must be remembered to shave off the ridge and male face of the corner block, as shown in Figure 4, and further ensuring that the shaved ridge points upward and the shaved male face point's outwards. One must start the first course with a ½ block.

**INTERLOCKING MASONRY FEATURES**

The interlocking blocks if made with fly ash combination has following unique advantages over other comparable products:

- Density of masonry can be reduced in the range of 13 – 17KN/cum against the conventional fired brick System (19.20 KN/cum) in terms of unit weight.
- High finish blocks are made; result in exposed finish aesthetic walls, saving on plaster/rendering & finishes.
- Blocks can be made with lower water absorption properties making them useful for even relatively wet applications.
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ACRONYMS AND ABBREVIATIONS

- BOQ: bill of quantity
- Bs: british standard
- CAD: Computer aided design
- DL: dead load
- Kg: Kilogramme
- KN: Kilo Newton
- LL: Live load
- N: Newton
- M: metre
- Mm: Millimeter
- OPC: Ordinary Portland cement
- BR: Bedroom, Brick, Brass, Boiler Room Branch
- HVAC: heating ventilation and air conditioning
- Is: international standard.

DISCUSSION OF RESULTS

The responses from site engineers and operatives were analyzed and interpreted under the following points:

- Use of construction fire clay bricks and compressed earth bricks as construction materials in MUSANZE Town.
- Comparison in compression between fire clay bricks and compressed earth blocks.
- Economic activities Held on using both type of materials
- Comparison in Environmental management provided by using both type of materials.
- Comparison of Development of the country provided by the use of both type of materials.
- As the same articles and rules guidelines say our project fit to the standard code follows under:

- On the one hand the weight of the block, bearing, in mind that they are solid blocks which are principally used in masonry. On the other hand the work (or nominal) dimensions of length (l) width (w) and height (h) which will determine bonding patterns. The CEB is very flexible in the way it can be used for many configurations of wall and roof building systems construction of arch, floors, vaults, domes and arched openings.
CONCLUSION

The researcher is encouraged the increasing economy through reducing the cost of combustibles and protecting environment of our country by using compressed earth blocks and to promote the ability

The study was carried out to find out the comparison between compressed earth blocks and fire clay bricks for the purpose of reducing the cost building in order to construct affordable building in Rwandan country. The technology will also contribute immensely towards poverty alleviation by proving job opportunities to the members of community. An improved housing situation comes with improved health and a good sense of wellbeing.

Authors contribution, IST Burkina Faso, WDA work force development authority hold in charge of construction industry in Rwanda.

Founding: none

REFERENCES


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Keyword: Compressed Stabilized Earth Bricks (CSEB), Bond Patterns.