## INTRODUCTION:

We have once published a book titled "BUILD YOUR OWN HOUSE" The title went out of print and we have continued to receive enquiries demanding the book or the contents of it. The present book will be an updated version of the old that contains a recent estimate, which have the intension of being used as a guide only.

The title is written to assist a person needing to build his or her simple structure a bungalow called down stair. It will attempt to encourage individuals to be involved in the sourcing of materials, Labour etc. for one own house. Please note that this book is not all empompassing neither is its intension that of making readers able to start and finish the building of a house without the assistance of a Builder, Architect and other Technical Building professionals.

It is our believe that individuals contribution to the supervision of their housing construction will help to control and reduce housing cost and wastages. Readers would know a little on the project they are embarking on and will be able to ask questions, get answers - not being a complete or total illiterate to building / houses related issues.

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Bolyn const. Co. Ltd.
Lagos.
2012



## HOW TO ACHIEVE LOW COST HOUSING
## (Things to consider if we must reduce the cost of building Houses)

***PREAMBLE***

Attempts have been made by several tiers of government in Nigeria to provide affordable low cost houses for the low income earners in Nigeria since independence. Most of the attempts have either failed or short lived because of lack of transparency, inconsistency and lack of continuity in governance and government policies. Efforts have been to introduce local materials to build affordable houses but the axiom to lead by example have been lacking as no visible government sponsored projects have been built around Nigeria using local materials a case of "do what I say not what I do". Low Cost Houses have been successfully built around the world and examples abound everywhere in Africa, Asia, America and Europe. The causes of failure in Nigeria is attributable to insincerity, lack of will power to champion the cause of the masses, misplaced priority and self centeredness of officials whose duty is to advice government on how to achieve Low Cost Housing. To be candid, for a House to be Low cost a lot of sacrifices have to be made by all its executors. All who desire to see this dream come through must forget about "What is there in it for me" and be satisfied with the Good Name that posterity will bestow on him as it did for Alhaji Lateef Jakande the erstwhile ACTION GOVERNOR of Lagos State.

The sole reason why no one is ready to promote Low Cost Housing is that if a House is low in cost the financial reward will be little-it cannot make anyone rich speedily. Most of us have forgotten that "A good name is better than Gold and Riches". It is confirmed that the cost of a house can be low in cost or relatively cheap but this will only be possible if a combination of several

factors are put in place to cut wastages – Procurement, Production, Construction, Sourcing of Finance and Building Design. The adaptation and use of locally sourced building materials and components only is not a reason good enough to bring down the cost of a house. It has been identified that factors such as good and economic building design, efficient production system, competitive pricing of inputs, site production of most components of building, good construction management, adoption of tested cost –saving technologies of building that can reduce the cost of the foundation work, walling and wall finishes, flooring and floor paving works, roof cladding and roofing structures etc are jointly capable of drastically bringing down the cost of a house.

Please find below some suggestion which are capable of lowering the cost of a house if they are carefully considered and adopted where it is feasible:-

1. **NEED FOR PUBLICITY TO PROMOTE THE USE OF LOCALLY SOURCED BUILDING MATERIAL.**

   There is a need for government to support, promote and propagate the technologies of Low Cost Housing under the Federal Housing Ministry. The needed promotion should include implementation of numerous pilot and training projects which will encourage dissemination of valuable information to the public. It is advised that the promotion adopt non- sophisticated technologies that is easy to acquire and easy to learn. It should show case the attractiveness of building with Local Materials, its income generating potential, affordability and durability. There should be a weekly television programme that is educative and informative, it should give the viewing public room for questios and answers. seminars should be sponsored where Exhibitions and Demonstrations will be staged. The target audience will be future home



owners, self builders, small entrepreneurs, housing professionals in government and private sector, co-operative societies, military, police and other institutions etc.

More Nigerians are bound to accept and adopt these low cost technologies of building when publicized to the extent that individuals, communities and organizations will offer competitive services that will be advantageous to the general public.

2. **THE ROLE OF THE NIGERIAN ROAD AND BUILDING RESEARCH INSTITUTE**

   For over 30 years NIBRRI have researched and have achieved varied successe in the invention of machineries that can process and produce acceptable Building Components from our Local Materials. They have promoted these technologies in some part of the country but a lot still needed to be done in the field of technology promotion, technology transfer, training etc. The fact that they are not under the federal ministry of housing does not help the cause of housing the masses of Nigeria. They can help Nigeria by concentrating on their statutory role (i.e) researches while only empowering others to build the required houses. They should organize training programmes throughout the year and even involve many African countries who are in dire need of low cost housing technologies.

3. **USE OF CEMENT-STABLISED LATERITE BRICKS**

   Laterite soil, the main material used for the above is often cheaply or freely found while cement for stabilization (if needed) can be found in any market centre in Nigeria. houses built with the above are durable, aesthetically pleasant, cool in summer, warm in winter and the

production technique of these bricks is easy to learn and they can be produced on the building site using local labour that is cheaper

The following Building components are capable of being made with the non-expensive simple hand operated[ manual /mechanical] brick presses locally available.

(a) Lintel Bricks.
(b) Floor Brick (For Internal Flooring).
(c) Walling Bricks (Dry stacked, Liquid Mortar and STANDARD SIZE Bricks).
(d) External Floor Paving Bricks.

**4. NO CEMENT OR LEAST CEMENT CONTENT.**
**OPTION (SOIL BLOCK).**
Do not add cement to stabilise material which are not to be exposed to water e.g. Protected Walls, Rendered Walls and Internal Walls which have been well designed. If this method is adopted, a house can be built cheaply, (See page 36 of Compress Earth Blocks, a 1994 EAG, International Centre for Earth Construction, France).

**5. SOUND ECONOMIC DESIGN.**
**WALLS.**
The Architectural design should be economical and adopt minimal number of walls.
**LINTEL**
There is a Channel Brick produced from Brick Press that can be used instead of the Conventional Gravel, Sand, Cement and Re-inforced Steel Rod Lintel. This have the ability to save materials, formwork and construction time. This channel uses Sand-cement mortar-light re-enforcement with minimal formwork.



**FLOOR BRICK (INTERNAL).**
Floor Bricks using Cement Laterite materials are capable of being used to substitute concrete flooring called German concrete floor. This ought to result in some savings and it can be produced from a simple Brick Press on Building sites.

**ROOFING WORK.**
(a) A saving in cost of Roof Cladding is achievable if Fibre- Concrete Roofing Tiles are produced on the site and adopted.
(b) However, a roof design that will eliminate expensive roof trusses is possible as wooden purling could be supported by load bearing side walls of a house. The designs of the Roof Structure must take this into account.

**6. SITE PRODUCTION OF BUILDING COMPONENTS.**
Substantial savings are derivable from producing Building Components on the Building site as Lots of the cost of transportation are heavily reduced. Quality of products produced on site can also be monitored and supervision made easier.

**7. BULK PURCHASE OF MATERIALS OF BUILDING.**
All materials required on a Building/Project site can be negotiated to take advantage of Bulk purchases. Direct supplies from manufacturer or main source is realizable for items that must be purchased eg. Soil, Sand, Rods, Paint, Cement, Planks and all Building components.
This is especially important in Estete or Co-oprative houseing delivery.

**8. ELIMINATION OF MIDDLE MEN**

As far as it is possible-middlemen should be avoided. If they can supply at a price, same items bulk purchased can be gotten at about 10% , 20% or 30% less the cost of middlemen supplies.

**9. PROVIDE TRAINING FOR UNSKILLED & SEMI-SKILLED LABOUR.**

It is best to use young school leavers who are unskilled or semi-skilled, who will be trained to adopt a culture of hard work, diligence and efficiency. This crop of people will accept a moderate fee. They are not likely to be lazy, pretenders and exploiters like the skilled labour who are less teachable. Skilled workers are engaged for special work and general supervision.

**10. DIRECT LABOUR AND TASK WORKMEN.**

It should be possible to pay each worker per his daily accomplishment, this way truancy is reduced, laziness and performing shoddy work in controlled. All aspect of the works available in a House can be rated and Labour/Workmen engage to carry out the works are being paid by what they achieve individual or in a group. A contractor will definitely ask for over 50% to 100% more than the actual labour charges.

**11. STANDARDIZATION OF PRODUCTS.**

It is known in production that it is easy to produce products that are repetitive and so if we have uniformly dimensioned products it is easy, faster and better produced. A system where products will not fit a design dimension should be avoided standardisation saves workmen time.

**12. PRECASTING COMPONENTS.**



Concrete Building components can be pre-cast within a project site and lifted into space created for each in the building design. This will result in saving of time as several units can be produced daily. The design will be in such a size easy to be installed by a few people. Such items include, Beams, Concrete Rings, Lintel Beams etc.

**13. MODULAR CONSTRUCTION – LIQUID MORTAR IN BRICK HOLES AS WALLING COMPONENT**

A modified Brick Press is available for producing a cement stabilized block/brick that can be laid dryly and are automatically inter-aligned (i.e) lay 10nos. courses before grouting with sand-cement. This technology can be neat, fast, saving up to 30% of the mortar required to join' conventional walls. The technology is easy to learn by the unskilled labour.

**14. MANUALLY OPERATED BRICK PRESSES**

We have in the Nigeria market inexpensive, tested, manually operated Brick Presses that offer compression on Bricks that are capable of being used for up to 2 (two) storey Buildings. They produce the following types of Bricks;-

(a) Cinva Ram Bricks (Standard Brick)
(b) Dry btacked Bricks (No-Mortar Joint) Interlocking.
(c) Liquid Mortar Interlocking Bricks.
(d) Paving Bricks (External Floors).
(e) Floor Bricks (Internal Floor).
(f) Lintel Bricks (Channel Bricks).

***The following are the advantages of the Manual/Mechanical Brick Presses:-***

(a) Low Investment Cost.

(b) Small size and Light weight and can easily be transported from site to site.

(c) Locally manufactured (No import) and easily repairable by local welders.

(d) Although labour intensive, yet it offers an energy saving production process.,

(e) Easy maintenance and easy to operate

## 15. SELF HELP AS A MEANS OF COST REDUCTION IN PROVISION OF HOUSES.

The Government of a Nation need not to build or provide houses for all, yet the government can facilitate house ownership for all by dissemination of information, demonstrating technologies of building and training individuals and groups from the Local Government Councils, Communities, NGOs, Institutions, Housing Co-operatives, Military, Police, Religious Groups, Schools and Association. The individuals and group can be empowered by the release of grant of small loan to procure simple Brick Presses and Roofing Tiles making Machines which they will in turn rotate among themselves and contribute their own labour to build their own houses using communal labour.

The UNICEF is an example of an organization that has donated Brick Presses and Training to state and communities in Nigeria over the last 16 years.

Bolyn Constructions Company Limited have for ever two decades been promoting the technologies of Affordable Housing through the 100% locally sourcing of materials for Building Below please find identifiable concepts to adopt to achieve a truly low cost Housing construction.



A. Adopt a simple, cost effective Design that are Funcction, and that 100% locally sourced building materials.
B. use local labuour with good and efficient suervision.
C. Train local labuour to produce your bricks and roofing Tiles/sheets on your building site.
D. B e personally responible for Quality control of your building products.
E. Avoid using middlemen for your procurememt.

COMPRESIVE STRENGTH OF CEMENT STBILISED BRICK . Often strength is used as an indication of durability of products rather than structural adequacy. 28kgf. sq. cm has been found to be the minimum wet compressive strength adequate for a single or two storey dwelling and samples of test on stabilized bricks have shown an average of about 50kgf \sq. cm .no problem have been known about negative structural performance even in not properly supervised construction works.

Anlysis of a house a house should act as a home not onlg giving its inhabitants shelter for protection but also it ought to be a social centre, a place of health, comfort and happiness. It should act its function to infants, children, adults, both men and women including the elderly whether healthy or sick.

The followings are some of the family activities that must be adequately provided for in a home/house:-

| | | | |
|---|---|---|---|
| (a) | **Cooking** | - | A kitchen. |
| (b) | **Dinning** | - | Kitchen Verander, Separate Dinning room or Garden . |
| (c) | **Rest/Relaxation** | - | Verander, Staircase hall, a Lounge or Drawing room. |
| (d) | **Sleeping** | - | Bedrooms and Roofing Terrace in summer |
| (e) | **Study** | - | Verander, Dinning room or |

study room in a bigger House.

(f) **Child Play** - Room, Verander Courtyard, or Nursery in bigger house.

(g) **Storage** - A store room, Wall cupboard, Wardrobes, Under ground cupboard.

(h) **Concentration** - A secluded room, Separate for quiet time.

(i) **Recreation** - Living room, Back Verander, Dinning room.

(j) **Toileting** - Dressing room, Bathroom, W.C.and Urinals.

(k) **Reception** - Front Verander, Drawing Room, Library, Guest room, Study room.

(i) **Drying Clothes** - Open courtyard & Back Verander.

(m) **Entering & Leaving** - Front and Back Verander & Kitchen.

***Some of the uses of these facilities are:-***

I. **Verander** - is an open terrace used for keeping shoes, walking stick, umbrellas, cycle and a waiting place for visitor. It can avail access to several other facilities /room and a sit out in cool weather.

II. **Drawing Room/ Living Room** - A spacious room, it is equally called a drawing room lounge or a living room, usually a relaxation place with several furniture. It serves as venue for all



social functions. It is sometimes used for dinning and studying the walls of this room should be fitted with pegs for hanging photographs and souvenirs.

III. **Bedrooms** - These are the most important rooms in the house, we spend at least one third of our life resting in our bedroomsh the master bedroom should be spacious enough to accommodate a double bed and have its own bathroom/toilet.

IV. **Dressing Room** - Usually attached to bedrooms used purely for dressing, study etc. having ample light, mirror, chair, table etc.

V. **Kitchen** - This is a very important room that must be planned to have light, garbage bin, ventilation, shelves, water in wash hand basin, smoke outlet, storage space in cupboard and well laid wall tiles.

VI. **Dinning Room** - A separate Dinning Room needed to be close to the kitchen and preferably built with wash hand basins. A

combined living-Dining room is most economical because the Dinning room is in use only for less than two (2) hours daily.

VII. **Ladies Apartment** - Is very important for mother and child- children during their early days and so, sufficient light and ventilation is of importance

VIII. **Store Room** - Called pantry- This facility is only necessary in the middle classes category. The size of 3.2m x 1.8mm (10ft x 6ft) is enough for a store /pantry.

IX. **Bathroom** - This room could be near to the kitchen. It should be well lighted and ventilated It could have ashower/shower tray. The installation of ceramic wall tiles is almost compulsory to save the wall from being permanently wet.

X. **Guest Room** - This is a spare room ready to welcome visitors at all times. It can be used for varied other purposes when no guest is visiting. It is best for it to have bathroom / toilet if it is affordable.

XI. **Water Closet and** - The W.C. is flush with water



**Toilet Room**

down into the septic tank. A wash hand basin is usually installed while wall that can be affected by water are to be laid with ceramic wall tiles.

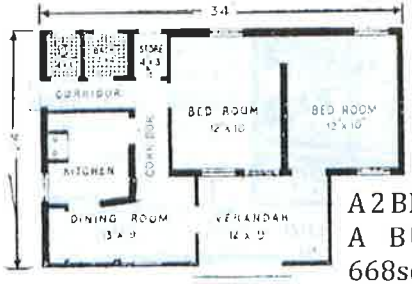
## BUILDING PLANS

We have included in this book some building plans and their elevations just as guides to aspiring house owners. We wish to state that we have in each towns and cities, Architects and Architectural one wond that individuals can consult for the purpose of designing, preparing drawings and getting necessary government approval for the design drawings of their desired house.

People need houses for shelter and warmth. A house consists of foundation,DPC, Walls, Floors, Doors, Window, Roof, Ceiling, Wardrobes etc. A house starts with a plan drawn by the Architect showing the placement of the rooms, windows and all other details of the house. A house can be built of stone, wood, concrete, brick (fired or mud/ cement). Special bricks can be made for different area of the house. Bricks can be held together by mortar which is a mixture of sand, cement and water or sand,

mud, cement and water etc. We are advised to pay attention to the details of our house construction as this is a lifetime investment, individuals should determine the requirements for their family and ensure the House Design is made to suit their need. However, we are advised to build a small house that can be improved upon in later years when one is more financially empowered .

ELEVATION



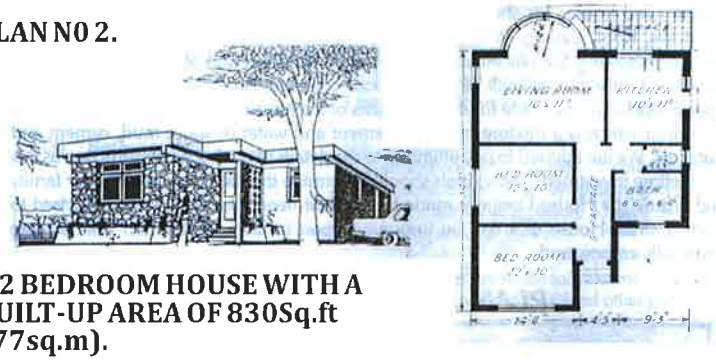

A 2 BEDROOM HOUSE WITH A BUILT UP AREA OF 668sq.Ft(62sq.m)

**DESCRIPTION OF PLAN 1 – HOUSE**

This is a simple 2 (two) Bedroom House that can be built with cement stabilized laterite bricks with internal plastering. The external wall can be left without plastering if the walling bricks are cement stabilized with at least 5% cement. The 9 (nine) feet verandah is virtually a living room. The House contain 2 (two) standard bed rooms, kitchen cum dining room, a store, bath and W.C. with a lobby. It is compact and convenient for a small family. The plan is subject to modification to suite individual needs.



**PLAN NO 2.**




**A 2 BEDROOM HOUSE WITH A BUILT-UP AREA OF 830Sq.ft (77sq.m).**

This is a house which although is small but have the advantages of bigger houses. It should be comfortable, convenient. and easy to run. It consist of a living room, 2 (two) bedrooms, kitchen, bathroom and a W.C. The semi-circular large window in the front lends charms to the living room. Although there is no dining room, yet the living room can serve as dinning area. This House will easily fit into a small plot. The design of the house help create an impression that the house is big.

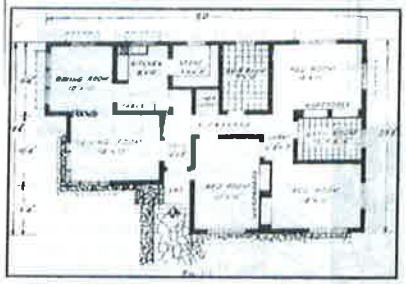
**PLAN NO 3.**

This house type is simple, straight forward and uses up spaceeconomically. It provides all the elements of comfort and amenities required by medium size decent middle class family. The living room is linked with the dinette by a simple screen.

This 2 (two) bedrooms house has built in wardrobe and can convert the Dinnette to a study room while extending the kitchen up to the Bathroom so as to accommodate a Dinning room cum kitchen, this will necessitate the closure of the rear exit. A modern bathroom is provided with cross ventilation while the exterior is simple, having a quiet dignity.

**FLOOR PLAN FOR PLAN NO 3**

**A 3 BEDROOM HOUSE WITH BUILT UP AREA OF 1325Sq.ft (123sq.m)**



This is a fairly large House designed for a middle class family of about 7 or 8 members. The living room although small can be used in combination with the Dining Room both of which is separated by indoor plant. The kitchen is both linked to the Dinning room and the store.

The house is served by 2 (two) large Bathrooms with sizes big enough to accommodate bath tub, lavatory basin, towel rail and a shower. All the bedrooms have built in wardrobe, the central passage communicates with all the rooms and bathrooms. The roofs maintained different heights.

**PLAN NO 5.**

**A 3 BEDROOM HOUSE WITH A BUILT IN TOILET/BATH HAVING A BUILT UP AREA 1745Sq.ft (162sq.m)**

This is a luxurious house having all 3 (three) bedrooms installed separately with W.C and

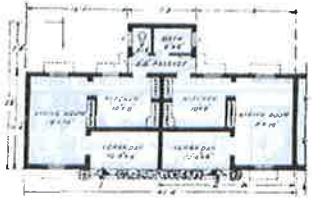


bathroom plus a Built in wardrobe. The Dining room of size 13 feetx20 feet is stately and can be combined with the sitting and living rooms to accommodate a large gathering on festive occasions. There is an open terrace for multipurpose service e.g. outdoor dinning on moonlight nights, or outdoor relaxation/sleeping in summer to enjoy cool breeze. The exterior is simple, dignifying and most inviting.

**PLAN NO 6.**

**ONE BEDROOM FLAT WITH A TENEMENT AREA OF 365Sq.Ft. (34sq.m)**

**PLAN NO6**



This is a block of flats (One Bedroom flat each) suitable for working class people in industrial area of towns in rural commodities where land is comparatively cheap. There is no limit to the numbers built in a row. The verandah can be converted to other useful purpose by building a wall that can turn it to a room for multi-

purpose. A bathroom and W.C. was built to serve 2 (two) flats. The elevation is beautiful and modern.2 (two) Cupboards and a shelve is provided per flat.

**BUILDING CONSTRUCTION.**

There are professionals whose duties are to build houses and they go by different names as per their individual functions in the house construction e.g. Bricklayer called Mason, Carpenter or Roofer, Plumber, Electrician etc. These are knowledgeable people in their chosen filed but they will need to work under the supervision of the Architect, Builder, Engineer, Supervisor or a Building contractor.

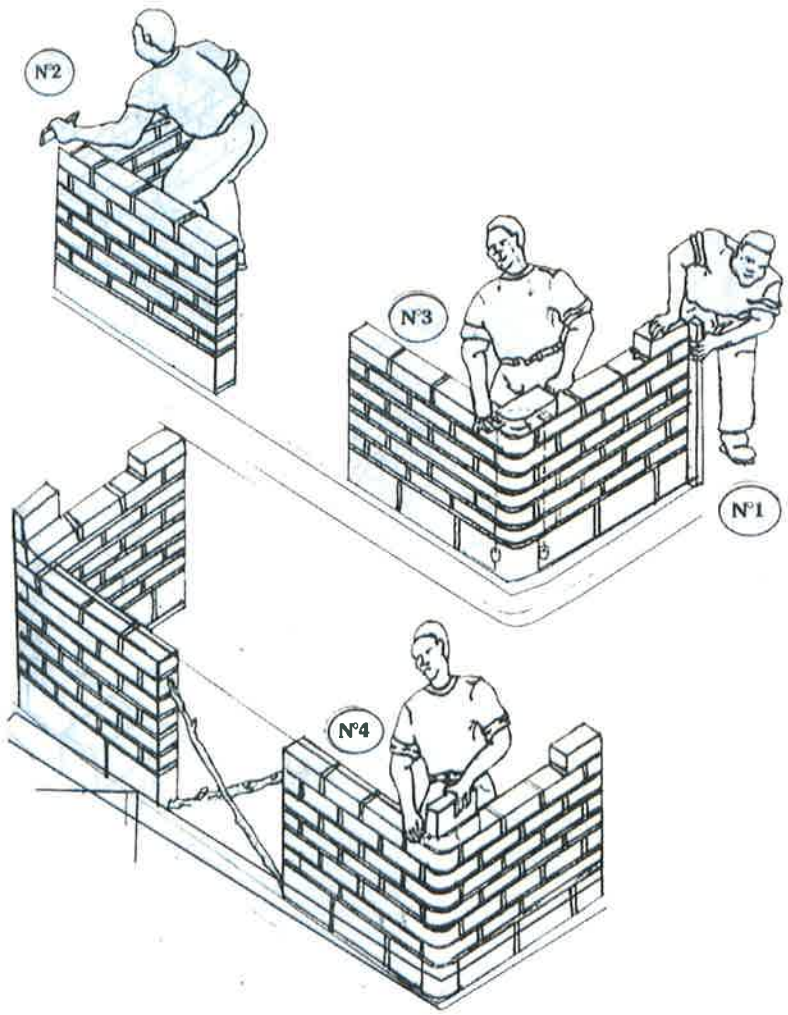
This is to say that there must be an Experienced Builder who will take charge of the supervision of the whole construction. Some prospective house owners have asked for construction details, some of which we are giving in the few pages ahead. We have to inform that it is just a guide to all, as it cannot serve as a teaching guide for a –do- it yourself builder who have no training or experience in house construction.

**MASONRY: BASIC PRACTICE MASONRY WITHOUT GAUGE RULE**

For each layer, start by laying the corner block and check:

| | |
|---|---|
| N$^{0}$ 1 – Height: | with the rule. |
| N$^{0}$ 2- Horizontally: | with the level. |
| N0$^{3}$- Vertically: | with the plum bob. |
| N$^{0}$4- Alignment: | with the line. |

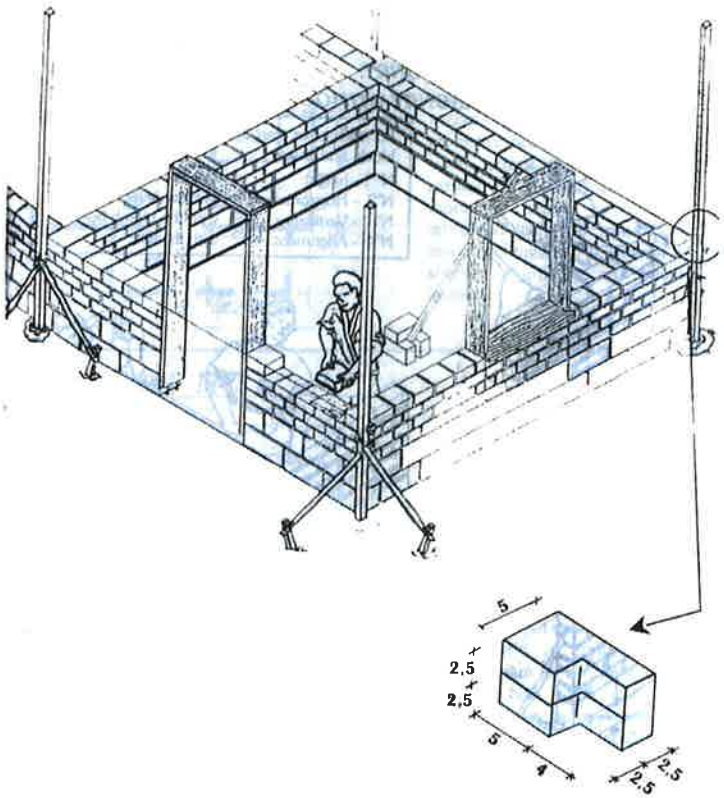




**BASIC PRACTICE.**
**USING GUAGE RULES AND CORNER BLOCKS.**

IMPORTANT:
Check every day the verticality of the corner rules and control the stability of the braces.

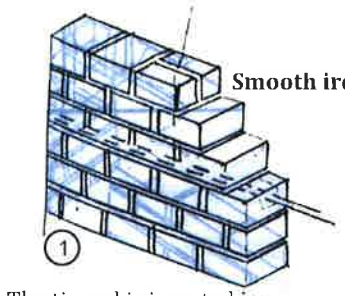
**MASONRY ROOF ANCHORAGE.**



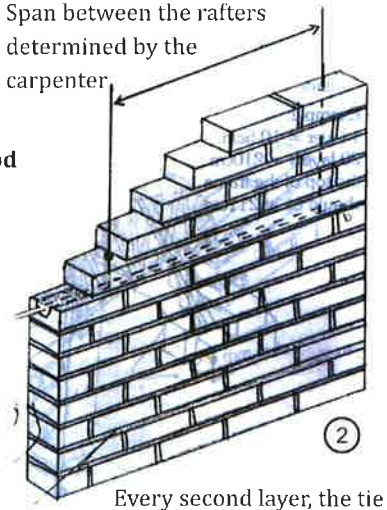



**INTERNAL ANCHORAGE.**

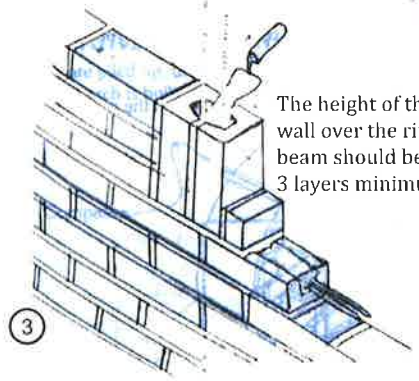
.For hollow blocks it is easy to insert a tie rod between the ring beam and the top of the wall.
For plain blocks (burnt bricks, CEBs)
4 Solutions can be implemented:




The tie rod is inserted in the mortar, when the blocks are square.

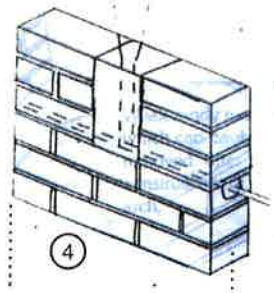



Every second layer, the tie rods cross a hollow brick




The height of the wall over the ring beam should be 3 layers minimum.

The tie rods are cast in concrete which is poured between two U-space blocks laid vertically

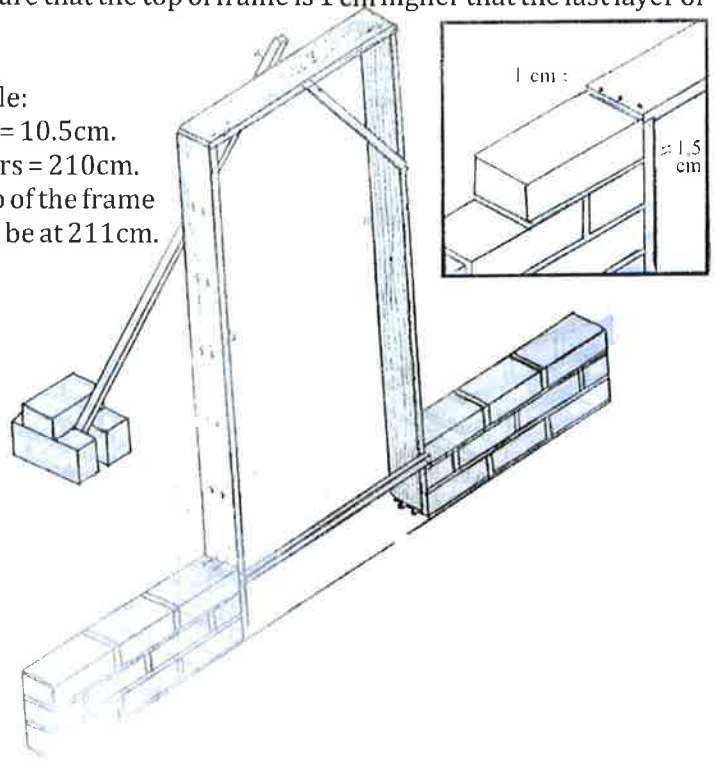



Concrete is cast between the bricks.

**MASONRY OPENINGS.**
BUILDING IN A WOODEN FRAME.

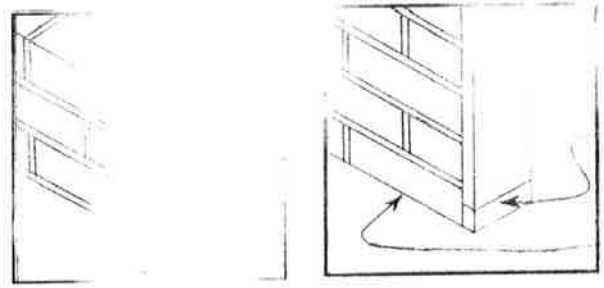
Position of the frame:
Make sure that the top of frame is 1 cm higher that the last layer of bricks.

Example:
1 layer = 10.5cm.
20 layers = 210cm.
The top of the frame should be at 211cm.



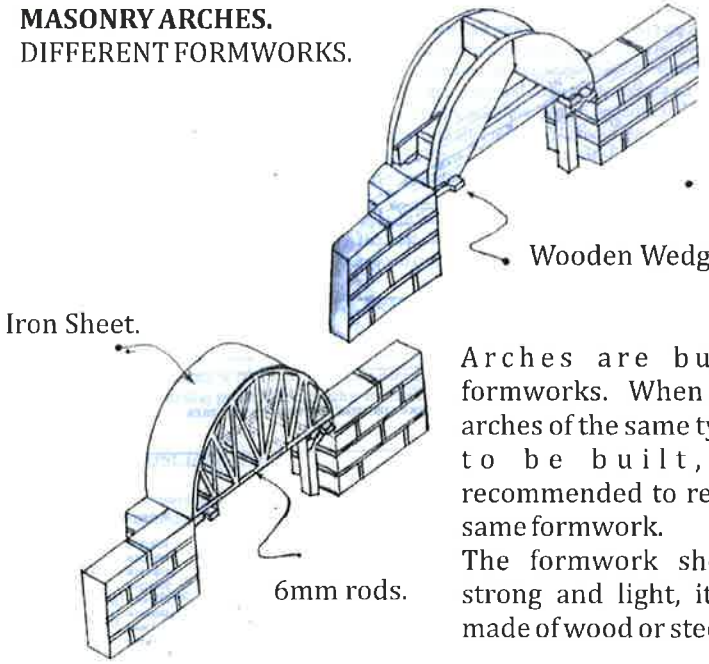

The brick rule should always be used to check the height of each side Or each level and joint can be drawn on the frame.
When the shrinkage of the stabilized mortar is very limited, it is possible to seal the frame while building up the wall:
2 nails every 3rd layer, inserted in the mortal joints.





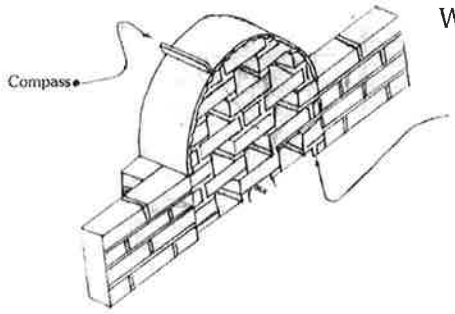
At the base:
The wood is not in contact with the ground
Cement –finished ground level

**MASONRY ARCHES.**
DIFFERENT FORMWORKS.




Arches are built on formworks. When several arches of the same type have to be built, it is recommended to re-use the same formwork.
The formwork should be strong and light, it can be made of wood or steel.

**ALTERATIVE SOLUTION: THE BRICK FORMWORK.**
Bricks are piled up, using a weak sandy mortar,
Once the arch is built, the form is removed and the bricks are re-used.




Weak sandy mortar which can easily be removed after the construction of the arch.

**Foundations**
It is not the intention here to consider in detail the design of foundation. However, because the quality of a building will to a large extent depend on a good foundation some mention must be made.

**ESTIMATING AND COSTING.**
The major reason for considering the writing and compilation of this book is for it to help users to appreciate, understand and familiarise themselves with this very important subject. All technical personnel involve in Building construction whether an Engineer, Estimator, Experience Draughtsman, Contractor etc. can work out the analysis of rates, compute or calculate the quantities of materials required for a building and the expenses that are likely to be incurred in the ceurse of building construction. The reason why an estimate is required is for the owner/builder to have a fore knowledge of needed finance for the house. To be able to do a good job in estimating and costing,



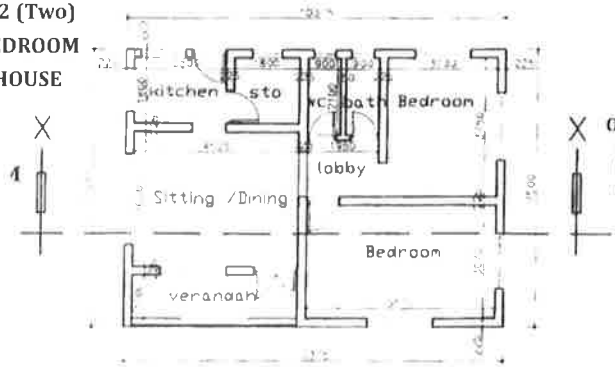
we require an understanding of the building drawing, have knowledge of dimensioning – length, breadth and height. There will be a need to visit all items for construction one after the other without leaving any. A material specification is essential as there are different type of items that can be used for same purposes e.g Louvred window, Aluminum window, steel metal window, wooden window etc.

A great care is required not to omit the certain items or to use a low rate/high rate for an item than it is the cost. The cost of labour, transportation etc. including profit for contractor must all be taken good care of.

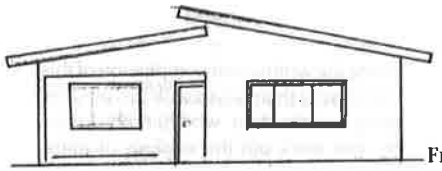
**AN ESTIMATE OF A 2 (TWO) BEDROOM HOUSE (APRIL 2012)**
Bolyn Constructions Company Ltd. is happy to avail users of this book a detailed summary of the cost of building a 2(two) bedroom house with the following facilities as in the plan, elevation and sectional elevation provided:

| | | | |
|---|---|---|---|
| a. | One Verandar | - | 1.2m x 4.42m (4.oftx14ft 6") |
| b. | 2 Bedrooms | - | (a)(3.05mx5.18m (10ftx17ft) |
| | | - | (b)(3.81mx3.05m(12ft 6" x 10ft) |
| c. | One sitting /Dinning Room | - | (3.66m x4.42m (12ft x 14ft 6") |
| d. | One kitchen | - | 1.80m x 2.51m (6ft x 8ft 3") |
| e. | One store | - | 1.80m x 1.80m (6ft x 6ft) |
| f. | One Bath Room | - | 2.10m x 0.900m (7ft x 3ft) |
| g. | One W.C. (Toilet) | - | 2.10m x 0.900m (7ft x 3ft) |

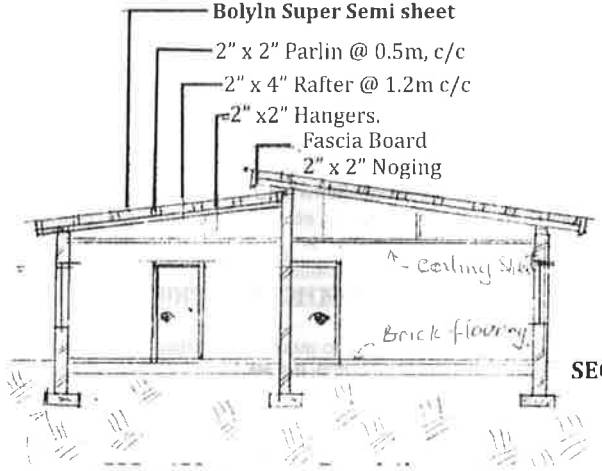
A 2 (Two) BEDROOM HOUSE




Design & Estimated by:
**O. Ayo Adebanjo**
P.O.Box 10253
Dugbe-Ibadan:
08033806737,
08055265219



**Front Elevation**




**SECTION XX**

**525 X 150 mm conc. Foundation**



MEASUREMENT/QUANTITIES OF MATERIALS.
This details are brought down to the level of the ordinary Nigerian for a better understanding as follows:-

1. FOUNDATION.

| Description | Foundation (1) (Digging) | Foundation (2) (Concreting) | Foundation (3) (Blockwall) | Foundation (4) (Filling block holes) |
|---|---|---|---|---|
| Length<br>Width<br>Height | 67.05m<br>0.52mm<br>0.75m | 67.05m<br>0.525mm<br>0.150mm | 67.05m<br>x3<br>Courses | NIL |
| Volume | 27 Cu.m approx | 5.28cum. | 420 Nos Blocks | 3.544cu..m |
| materials | nil | 2 Nos 5 Tonne load Granite/Gravel ▪ + 1 No 5 Tonne Load sharp sand + 24 Bags of cement | 420 Nos 9 inches Block ▪ + 1 N0 5 Tonne Load of sharp sand + 5 Bags of cement | 2 Nos. 5 Tonne Load of Gravel + 1 N0 -5 Tonne Load of sharp sand + 10 Bags of cement |
| Labour per CU.M | N800= per cubic Metre | N4,550 per cupic metre | N41,000= Lump for (3) and (4) | |

SUMMARY

1. Materials
   (a)40 bags of cement @ N 2,000 = N80,000
   (b)4 loads of Grave\ Granite @ N 35,000 = N140,000
   (c)3 loads of sharp sand @ N 13,000 = N39,000
   (d)420 Nos-9 sand crete Blocks @ N 180 = N75,600
   (e)Add for water @ N10,000 = N10,000
   Materials Sub Total = N344,600

2. LABOUR
   (a) Clearing of site @ N 8,000 = N8,000
   (b) Digging of foundation Trench @ N 21,600 = N21,600
   (c)Concreting(Foundation) @ N 23,024 = N23,024
   (d) Laying of Block walls and filling )
   Foundation Block holes) @ N 41,000 = N41,000

SUMMARY

1. Materials
   (a)40 bags of cement @ N 2,000 = N80,000
   (b)4 loads of Grave\ Granite @ N 35,000 = N140,000
   (c)3 loads of sharp sand @ N 13,000 = N39,000
   (d)420 Nos-9 sand crete Blocks @ N 180 = N75,600
   (e)Add for water @ N10,000 = N10,000
   Materials Sub Total = N344,600

2. LABOUR
   (a) Clearing of site @ N 8,000 = N8,000
   (b) Digging of foundation Trench@ N 21,600 = N21,600
   (c)Concreting(Foundation) @ N 23,024 = N23,024
   (d) Laying of Block walls and filling )
   Foundation Block holes) @ N 41,000 = N41,000
   (e) Back filling around foundation@N 10,000 = N10,00
   Labour Sub-Total = N104,624
   Cost of Total Foundation work) = N 449,224

ii BRICK WALL TO ROOF LEVEL
   (a) Nos of Bricks required.
   Total wall area=172square metre, with 30brick per square 5,160nos Bricks
   metre we require approximately

   (b) Wall laying requirements
      I. 23 Bags of cement
      ii 2 loads (5 tonne sharp sand)

   © Lintel Beam&Concrete Beam
      I 10 Length of ½ Rods
      ii. 3 length of 1\4 Rods
      iii. 1(one) Roll Binding wire



      iv. 2 Bags of cement
      v. 1 load of sharp sand

SUMMARY
MATERIALS
   a. 5160 Nos Bricks @ N 55 = N283, 800
   b. 1\2 Rods(101) @ N 1,950 = N19,500
III ROOFING & CEILING
Total area of Roof=115m2
Using Bolyn Super Semi roofing sheets @7Nos\Sq.m
Nos Required=805 Nos-Adopts 900 Nos.

MATERIALS AND LABOUR SUMMARY
   I. 3"x4" Wall plate (8L) @₦ 850 = ₦6,800
I I. 2"x4" Raffer plate (28L) @₦750 = ₦21,000
   iii. 2"x2" Purlin plate (68L) @₦ 350 = ₦23,800
   iv. 2"x2" Nangers plate(21L) @₦ 350 = ₦7,350
   v. 2"x2" Noggings (gol) @₦ 350 = ₦28,000
   vi.Tie Rods(80L) @₦ 140 = ₦11,200
   vii. Fascial Board (15L) @₦2,100 = ₦ 31,500
   viii. Nails - @₦ Lump = ₦24,000
   ix.Asbestos ceiling sheet (72Nos) @₦ 850 = ₦61,200
   x. Super semi-Roofing Sheets (900) @₦ 180 = ₦162,200
   xi.Labour (Roofing + ceiling) @₦ 120,000 = ₦120,000
   Total Cost of Roofing Work = ₦496,850

IV. GROUND FLOOR AND SCREEDING WORK
Floor Area = 64 Metre Square
Use: (I) Floor Bricks, - 1500pieces
   (ii) Cement in Bag - 20Bags
   (iii) Sharp Sand - 1Tipper Lorry load
   (iv) Allow for laterite filling sand to be determined on the construction site as per individuals site

MATERIALS & LABOUR SUMMARY

| | | |
|---|---|---|
| (a) 1500 Floor Bricks | @ ₦ 60 | = ₦20,000 |
| (b) 20 Bags of Cement( | @ ₦ 2,000 | = ₦40,000 |
| (C) 1 Tipper lorry load of sharp sand | @ ₦ 13,000 | =₦13,000 |
| (d) Water | @ ₦ 5,000 | = ₦5,000 |
| (e) Labor | @ ₦ 25,000 | =₦25,000 |
| | Sub-Total | =N173,000 |

V. WALL PLASTERING

Total Area of wall to be plastered -332.72m$^2$

| | | |
|---|---|---|
| (a) Cement Required-32Bags | @ ₦ 2,000 | = ₦64,000 |
| (b) Load of sand -2 Lorry load | @ ₦ 13,000 | =₦26,000 |
| (c) Labour | @ ₦75,000 | =₦75,000 |
| (d) Water Tanker (3 Nos) | @ ₦ 5,000 | = ₦15,000 |
| | Sub-Total | = ₦180,000 |

VI. PAINTING WORKS

Total Area to be painting
Roof Ceiling Area - 96m$^2$
Wall Area - 323m$^2$

| | |
|---|---|
| 30 gallon of emulsion painting | @ ₦ 30.000 |
| 5 gallon of Gloss Paint | @ ₦ 17,500 |
| Labor for painting | @ ₦ 40,000 |
| | Sub-Total= ₦ 87,500 |

VII. DOOR AND WINDOW

| | | |
|---|---|---|
| 6 Panel Doors | @ ₦ 20,000 | =₦120,000 |
| 3 Battened Door | @ ₦ 15,000 | = ₦45,000 |
| 11 Louver windows | @ ₦ 15,000 | = ₦15,000 |
| | Sub-Total | = ₦180,000 |



VIII. WINDOWS WITH FRAMES ETC.

Louver window, wood frames,
Louver Blades, frames and fixing

| | | |
|---|---|---|
| 6 Nos, size 1.8x1.2m | @ ₦ 18,000 | = ₦108,000 |
| 5 Nos, size 0.6mx0.6m` | @ ₦ 4,500 | = ₦22,500 |
| Labour for fixing | @ ₦ 15,000 | = ₦15,000 |
| | Sub-Total | = ₦145,500 |

**Total Unit Price of a 2(two) Bedroom House**

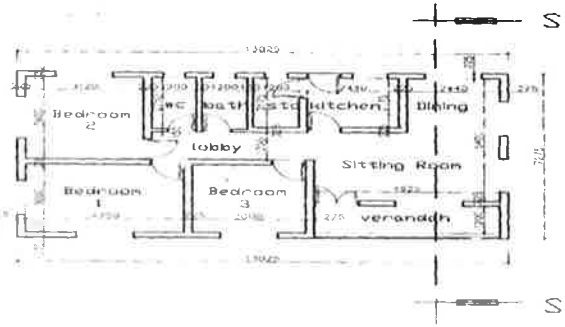
| | | |
|---|---|---|
| 1. | Preliminary work, Clearing&Setting out of site | ₦50,000 |
| 2. | Foundation work up to DPC | ₦449,224 |
| 3. | Walling above DPC, Lintel, Beams & Columns | ₦718,100 |
| 4. | Roofing and Ceiling work | ₦496,850 |
| 5. | Ground floor &Floor Screeding | ₦173,000 |
| 6. | Door & Lock + Fixing | ₦180,000 |
| 7. | Windows & Fixing | ₦145,500 |
| 8. | Plastering (Internally & Externally) | ₦180,000 |
| 9. | Painting (-Internally and Externally) | ₦87,500 |
| 10. | Electrical works | ₦80,000 |
| 11. | Plumbing & Sanitary works | ₦80,000 |
| | Total Cost Price: | ₦200,000 |
| | TOTAL | ₦2,840,174 |

# An Estimate of a 3 (three) Bedroom House (April 2012)

Detailed below is a summary of the cost of building a 3 (three) bedroom house with the following **facilities as in plan, elevation and sectional elevation provided:-**

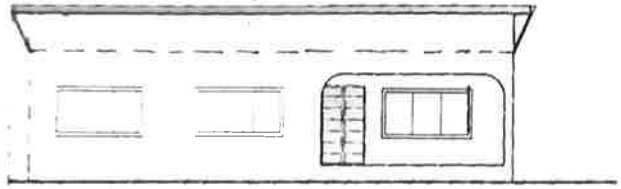
| | | | |
|---|---|---|---|
| (a). | A verandar | - | 4.72m x 1.2m (15ft 6" x4ft) |
| (b). | A sitting room cum Dinning room | - | 4.72mx3.03m (15ft 6" x 10ft) 2.44m x2.46m (8' 0" x8'0") |
| (c). | 3 Bedrooms | - | (a) 4.27m x 3.05m (14'0" x10ft) (b) 3.12m x3.66m (10'3" x12ft) (c) 3.05m x 3.05m (10'0" x 10ft) |
| (d). | One Kitchen | - | 2.44mx 2.46m (8ft x 8ft) |
| (e). | One store | - | 1.2m x2. 46m (4'0" x 8ft) |
| (f). | One Bathroom | - | 1.2m x2.46m (4'0" x 8ft) |
| (g). | One W.C. (Toilet) | - | 12.m x2.46m (4'0" x 8ft) |

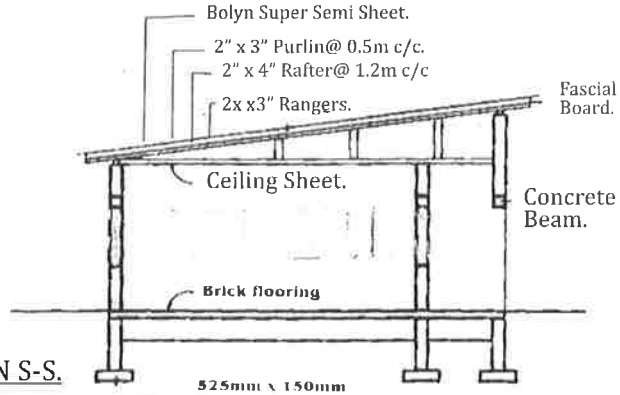
**A3- BEDROOM HOUSE**






**FRONT ELEVATION.**






SECTION S-S.

Designed & Estimated by:
O. Ayo Adebanjo
P. O. Box 10253,
Dugbe- Ibadan.
08033806737,
08055265219

***Measurement/Quantities of Materials***

1. FOUNDATION.

| Description | Foundation (1) (Digging) | Foundation (2) (Concreting) | Foundation (3) (Blockwall) | Foundation (4) (Filling block holes) |
|---|---|---|---|---|
| Length | 67.05m | 67.05m | 67.05m | |
| Width | 0.52mm | 0.525mm | x3 | |
| Height | 0.75m | 0.150mm | Courses | NIL |
| Volume | 27 Cu.m approx | 5.28cum. | 420 Nos Blocks | 3.544cu.m |
| materials | nil | 2 Nos 5 Tonne load Granite/Gravel + 1 No 5 Tonne Load sharp sand + 24 Bags of cement | 420 Nos 9 inches Block + 1 N0 5 Tonne Load of sharp sand + 5 Bags of cement | 2 Nos. 5 Tonne Load of Gravel + 1 N0 -5 Tonne Load of sharp sand + 10 Bags of cement |
| Labour per CU.M | N800= per cubic Metre | N4,550 per cupic metre | N41,000= Lump for (3) and (4) | |

SUMMARY

1. MATERIALS

| | | | |
|---|---|---|---|
| A. | 58 bags of Cement | @ ₦ 20,000 | = ₦116,000 |
| B. | 5 loads of Gravel Granite | @ ₦ 35,000 | = ₦175,000 |
| C. | 4loads of sharps sand | @ ₦ 13,000 | = ₦52,000 |
| D. | 515 Nos 9" Sand crete Blocks | @ ₦ 180 | = ₦92,700 |
| E. | Add for water | @ ₦ 10,000 | = ₦10,000 |
| | Materials Sub-Total | | =₦444,700 |

2. LABOUR

| | | |
|---|---|---|
| A. | Clearing of site | ₦8,000 |
| B. | Digging of foundation | ₦26,144 |
| C. | Concreting of Trench foundation | ₦29,757 |
| D. | Laying Block wall and filling holes in Foundation Blocks<br>Filling holes in Foundation Blocks | ₦45,000 |
| E. | Back filling around Foundation | ₦10,000 |
| | Labour Sub-total | ₦118,901 |
| | Total cost of Foundation work | ₦564,601 |

II. BRICKWALL TO ROOF LEVEL (Including 4Nos Cable walls).

(a) Nos of Bricks required

Total walls Area = 211 sq.Metre . With 30 Bricks per square metre.

We require

Approximately 6,330 Nos Bricks

External wall Area = $94.44m^2$

Internal wall Area = $116.56m^2$

(b) Wall laying Requirements

i. 26 Bags of cement

ii. 2 loads of sharp sand(5 tonne tipper lorry)

(c) Lintel & Concrete Beam

I. 10 length of 1\2" rods

ii. 3 length of 1\4" Rods

iii.1 Roll of Binding wire

iv. 3 Bags of cement

v. 1 load of sharp sand

vi. Gravel 1 no load + cement+ Rods (for concrete beam)



SUMMARY

MATERIAL

| | | | |
|---|---|---|---|
| a. | 6,330 Nos Bricks | @ ₦ 55 | = ₦348,150 |
| b. | 1\2 Rod (10L) | @ N1,000 | = N19,500 |
| c. | 1\4 Rods(3L) | @ N1,100 | = N3,300 |
| d. | Binding wire (lump) | @ N2,500 | = N2,500 |
| e. | Gravel 1 no load | @ N35,000 | = N35,000 |
| f. | Sharp sand (3tipperlorryloads) | @ N13,000 | = N39,000 |
| g. | Cement in Bags (30Bags) | @ N2,000 | = N60,000 |
| h. | Planks and Nails | @ N25,000 | = N10,000 |
| I. | Water(2tankers) | @ N5,000 | =N10,000 |
| | Material Sub Total: | | =N542,450 |

2. LABOUR

| | | |
|---|---|---|
| a. | Bricklaying to level | = N195,000 |
| b. | Bricklaying in Gable | = N20,000 |
| c. | Iron Bender | = N17,000 |
| d. | Carpenter | = N17,000 |
| e. | Casting of Lintel & column with Concrete | = N15,000 |
| | Labour Sub Total | = N264,000 |
| | Total cost of walling works | =N806,450 |

III. ROOFING AND CEILING

Total Area of Roof = 123sq.m

Using Bolyn Super Semi- Roofing sheet @ 7 Nos per sq.m

Nos required = 861 Nos adopt g 50 Nos.

Materials and Labour Summary

| | | |
|---|---|---|
| i. | 3"x4" Wall plate (12L) | @ N850= N10,200 |
| ii. | 2"x4" Raffer plank(30L) | @ N750= N22,500 |
| iii. | 2"x2"purlin plank (76L) | @ N350= N26,600 |
| iv. | 2"x2 Hanger plank(35L) | @ N350= N12,250 |
| v. | 2x2" Nogging PLK (100L) | @ N350= N35,000 |
| vi. | Tie Rods (100L) | @ N140= N14,000 |
| vii. | Fascial Board (14L) | @ N2,100= N29,400 |
| viii. | Abestor ceiling sheets(84) | @ N850= N71,400 |
| ix. | Bolyn super semi Roofing | @ N180= N171,000 |
| x. | Labour (Roofing/ceiling) | @ N150,000= N150,000 |
| xi. | Nails | @ N24,000= N24,000 |

{Total cost of roofing work} N566,350

IV. Ground floor and screeding work

Floor Area =78.124 metre square

Use: I. Floor Bricks = 2,000 copies
ii. Cement in Bag = 30 Bags
iii. Sharp sand = 1 Tipper lorry load
iv. Laterite soil Filling of House internal before laying of the floor Block will be determined on site

Materials and Labour summary

A. Block laying

2000 unit floor Bricks @ N60 = N120,000
30bags of cement @ N2,000= N60,000
1load of sharp sand @ N13,000= N13,000
Laterite filling sand (Assumed) @ N10,000= N30,000
Labour for block laying @ 31,000= N31,000
2tankers of water @ N5,000= N10,000
Total cost of flooring/screeding work: N264,000

V. Plastering

Total Area to be plastered =405metre square

Materials and Labour required
42 Bags of cement @ N2,00= N84,000

2 loads of soft sand @ N13,000= N26,000
Labour for work @ N100,000= N100,000
3 tanker of water @ N5,000= N15,000
Total cost of plastering workN225,000

VI. Painting

Total Area to be painted
A. Ceiling Bond - 111sq.m
B. Wall areas - 405sq.m
C. Doors & all wooden frames - Total 516sq.m

35 gallons of Emulsion paints @ N1,000= N35,000
8 gallons of gloss paint @ N3,500= N28,000
Labour for painting works @ N75,000= N75,000
Total cost of painting works N138,000



VII. Doors and Windows

8 panel Doors + locks
3 Battened Doors hocks
13Louver windows

a. Doors, Door frames & fixing

I.8Nos panel Doors with frames, Locks and fixing
(Size-0.900mx2.10m) @ N20,000= N160,000
ii. 3 Nos Battened doors with frames locks & fixing @ N 15,000= N45,000
(size 0.75mx2.10m)
iii. Labour for fixing @15,000= N15,000
Total cost of Doors etc.N220,000

b. Windows & Window frames

Louver window frames wood Frames, glass blades and fixing
6Nos-1.8mx1.2m @ N18,000= N108,000
3Nos-0.9mx0.6m @ N4,500= N13,500
1Nos-0.9x0.9m @ N4,500= N4,500
3Nos-2.1mx1.2m @ N18,000= N54,000
Labour for fixing @ N20,000= N20,000
Total cost for windows N200,000

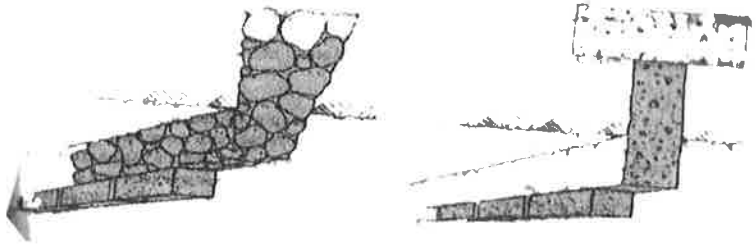
Total Unit Price of a 3(three)Bedroom House

1. Preliminary work, clearing & setting out of site= N50,000
2. Foundation work up to DPC = N564,601
3. Walling above DPC, Lintel. Beam and columns = N806,450
4. Roofing and Ceiling work = N566,350

| | | |
|---|---|---|
| 5. | Ground floor and floor screeding | = N264,000 |
| 6. | Doors + locks + fixing | = N220,000 |
| 7. | Window & fixing | = N200,000 |
| 8. | Plastering(int & Ext) | = N225,000 |
| 9. | Painting(int & Ext) | = N138,000 |
| 10. | Electrical Works | = N85,000 |
| 11. | Plumbing & Sanitary works | = N80,000 |
| 12. | Miscellaneous items | = N200,000 |
| | Total Cost price | = N3,399,401 |

Foundations

It is not the intension here to consider in detal the design of foundation. However, because the quality of a building will to a large extent depend on a good foundation some mention must be made



**BUILDING A HOUSE WITH LATERITE IS CHEAPER.**

Akinrolabu uses laterite in his building projects. He recommends it to whoever wants to save cost in building his house.

The number of those who sleep under the bridges is swelling. Those who are tenants, for sure, far outnumber those who are landlords. Even some tenants, one way or the other, find themselves homeless at some point. It's either that the landlord has ejected them, or that their building has collapsed. Recent reports of collapsed buildings in Nigeria are a good case in point.

According to the Managing Director of Bolyn Constructions



Company Limited, Mr. Rufus Akinrolabu, Nigerians are 16 million houses short of their housing requirements. The major reason for this is poverty and the high cost of building materials.

At the inception of the Obasanjo government, Akinrolabu notes, a committee was set up to, among others, determine how to bring down the cost of housing delivery in Nigeria. One of the conclusions of the committee, he notes, is that building materials constitute between 60 and 70 per cent of the cost of a house.

He says if one can do something about one's materials, one will have brought down the cost of building one's house. One way of bringing down this cost is to look inwards.

"We have, over the years, been used to cement-based materials and lots of imported building components that have continued to add cost to our houses in view of the inflationary trends and scarcity of the foreign exchange for the purchase of the items. We have refused to develop, improve or consider for use our God-given, abundantly-available materials for housing. "Akinrolabu, who spoke at a recent seminar organized by Realty Point Limited, regrets.

He says our forefathers built with mud, called laterite soil or filling sand, which we jettisoned because of some technological defects. Those buildings, he adds, never had a good foundation, damp roof course and good roof.

He describes laterite soil as a type of soil that contains gravel, sand, clay and silt. It is commonly found in tropical countries. This laterite, he submits, is also called mud and can be used with or without cement to make some bricks.

Some of such bricks are what Akinrolabu, an engineer, calls cement stabilized standard bricks. There are solid bricks, limited bricks, half bricks etc. the solid bricks, he explains, are load-bearing bricks that are strong and durable. The quantity of cement required to be added is between three and eight per cent.

Besides, there are cement stabilized flooring or paving bricks.

These ones, Akinrolabu notes, require about 10 per cent cement because of the wear and tear that floors are subjected to. He adds that they are a replacement for the "German Floor" that is usually made of gravel, sand and cement.

No-mortar interlocking bricks, he explains, are to be dryly stacked. This means there is no need to mortar-join the walls of the house. Liquid mortar interlocking bricks, on the other hand, involves using liquid mortar that is poured in bricks holes after laying 10 courses.

Akinrolabu says there are also lintel bricks, fence wall bricks and mud bricks. When you use lintel bricks, you save materials such as gravel, sand, cement and iron rods. Bricks used as fence wall, he explains, are beautiful, strong and durable. They do not need plastering as well. Mud bricks can be used essentially for internal partitions.

When you use any of these walling brick types, Akinrolabu says, you could save between N120,000 and N150,000 in transportation as it is produced from the site. Direct labour production, he adds, will save builders the profit that block makers would have charged. Moreover, less quantities of cement in the bricks result in reduced price. You could also save some money from the non-plastering and non-painting of the external walls.

"In managing our building cost, we should learn that it is best to build a smaller but functional house that can have a plan for future extension," Akinrolabu advises.

He suggests using cooperative societies as a vehicle for reducing the cost of land, fence walls, security and some other services. "It is cost-saving and economically wise if the group can jointly own their brick production equipments and tools such as wheel barrows, shovels etc. They can organize a workforce that will take charge of their building construction activities under a single supervisor while sharing all the associated cost among



themselves instead of individually," he further advises.

He says it makes a lot of economic sense if you can produce all the items that can be site-produced near the site. This cuts transportation cost, discourages diversion of materials and makes for effective monitoring.

ESSENTIAL POINTS

- Interlocking brick building system require lesser plastering.
- You could save N120,000 to N150,000 on transportation, as the material is readily available near the site.
- Cost of labour is reduced, as no mortar joining is required.
- Less quantity of cement in bricks results in reduced price.
- 50 per cent saving is possible if you intend building a mud brick house, 25 per cent if it's mud-cement brick house.

**NOW YOU CAN BUILD YOUR HOUSE WITH LOCAL TECHNOLOGY THAT SAVES YOU UP TO 50% COST.**

This technology also provides you a steady income stream after making your house a reality.

As prices of building materials continue to go higher above the reach of ordinary people, coupled with the excruciating cost of living to grapple with daily, it is unlikely that the majority of Nigerians who are in the low income class of the economy, may ever be able to gather together the millions of Naira they think they need to have their own house.

But far from the rising cost of things, the major hindrance preventing people from having their own roof over their heads is actually ignorance. How else can one put it when there has been a local technology for over twenty-two years now that is designed to enable one to have a house solidly erected at a cost of up to 50% less than what it would have taken, yet not many people know about it.

The quest to help the common man find an affordable way to

build his house began for Elder Rufus Bola Akinrolabu after he resigned his appointment as General Manager with Neptune Constructions Company Limited in 1987.

Trained in Civil Engineering at Madras College of Engineering, Southern India, Elder Rufus's professional career took off when he joined Bendel Steel Structure Limited, Warri as Engineer in Training, Hungry to test other turfs, young Rufus moved down to Lagos after his training to take up the position of Structural Engineer and Estimator with Neptum Constructions Company Limited.

Rufus's exceptional knowledge, brilliance, and performance on the job were enough to ensure his speedy climb of his company's corporate ladder. In less than two years he became the Technical Manager, and two years later he was the company's General Manager.

Having reached the pinnacle of his career and armed with great expertise, contacts and confidence that the could stand on his own, it was now time for Rufus to give vent to the creative juices flowing inside of him and take a dive into the uncertain, but immensely profitable world of entrepreneurship.

So in 1987, with little capital, but enormous hope that his expertise, experience and contacts will see him through, Elder Rufus established his company, Bolyn Constructions Company Limited to secure contracts to build heavy engineering structures like trailers, tankers, overhead and underground tanks, warehouses and other mighty structures.

These were exactly what his former company was doing – he was actually in direct competition with them, hoping he could pull off some of their customers who he had known personally. But the odds were critically packed against him.

According to him: "After one-two years of running around Lagos without success getting a meaningful contract, it dawned on me that it is not the same story. They have made their name. I had a



name under them when I was with them, outside of them, that name didn't ring much bell. Those who trusted me before could not trust me again because, "Where is my office? Where is my workshop? And where is my house (I was still a tenant driving a dilapidated car)? "If they added all the things I had together, they were not up to one-quarter in value compared to the job I wanted them to give me. That was a problem.

"After sometime sense had to be knocked into my brain that 'you are just wasting your time".

That horrid realization set Elder Rufus on a research to find a niche in his civil engineering industry to dominate. He had read a book titled Small is Beautiful, which taught him that the way to success in whatever anyone wants to do, is for them to start small. Also, in a book he saw the picture and read about a simple mud brick-making machine, which could greatly reduce the cost of building houses.

He knew this was a perfect solution to the need of millions of Nigerians who could not build their houses because of prices of building materials shooting above the roof. If he could make the solution possible, he will be putting a big smile on the faces of the common man, he reasoned.

But as simple as the machine looked, he couldn't even with his immense knowledge of structural engineering fathom its design.

Quickly, he got registered with the British Council Library where he got books to take home to read and return after a month. "I started researching into how to produce the machine, I wrote to France, India, Japan, Britain and Belgium – some of them research institutes – and they replied.

"Somehow, I was lucky! The German Appropriate Technology Exchange (GATE) replied me and sent a questionnaire to get information about what I had done before, and I mentioned all the machines I had used before.

"They asked me to pay one hundred Dutch Marks, which I did, though the money was difficult for me to get and they gave me a

design of the machine," Elder Rufus has perfected the design and production of the machine and has made about twenty different designs using the same principles as the first and has sold thousands throughout the country.

Elder Rufus' Multi-purpose Brick Press machine compresses mud into bricks to provide the major material used in building houses. The bricks are extremely dense, heavy and strong, much more than cement blocks.

Unlike cement blocks, which have voids or holes and therefore can be easily shattered with a hammer, bricks are so strong that they are bullet resistant, even nails find it difficult to penetrate them because they are heavily compressed. To prove the enormous strength in bricks to me, a brick was made in my presence in about two minutes only from clay soil with some water sprinkled on it, and the young man who made it stood on it while still wet without the brick crumbling under his weight.

In addition to those advantages that bricks have over cement blocks, houses built of bricks are cooler since bricks are heat resistant, and are more beautiful, such that you may decide not to paint it after it has been built, and it will still look attractive.

With Elder Rufus' multi-purpose brick making machine, one can do flooring, walling and fencing and achieve up to 50% reduction in cost of building. Explaining how this is possible, he says. "Mud is easily and cheaply found and because you can mould it on your site with the machine, transportation cost is zero. It is very suitable for rural communities and most parts of Nigerian cities are rural. For example, in Lagos, places like Ikorodu are rural. That's where the land that the low income or average man can even buy is. The soil is there, waiting to be moulded into bricks.

Without doubt, the benefits of using Elder Rufus' machine are enormous, it even allows one to build their houses gradually at their pace as they could afford until the house is complete, starting with walling, and later flooring, etc.

Much more than all the benefits that have been mentioned, to an entrepreneurial-minded person, the fact that one can start renting the machine to other people after their houses are



finished and making a steady income, will be of particular interest. This could even lead to a bigger business opportunity if one could stretch their mind a bit wider.

Having spent over two decades so far working to make housing affordable to the tens of millions of low income earners in the country, there will not be a roll call of experts in the Nigerian low cost housing industry without Elder Rufus Bola Akinrolabu ranking in the Presidential Committee in Alleviation of Housing Deficit during the reign of President Obasanjo and is presently the President, Building Materials Producers Association of Nigeria.

## ESTIMATED QUANTITIES OF MATERIALS REQUIRED PER CUBIC METRE OF COMPACTED MORTAR OR CONCRETE

| Nominal Mix | | | Water | Water Litres | Cement | | | Crushed |
|---|---|---|---|---|---|---|---|---|
| Cement. | Fine Aggregate | Coarse Aggregate | Cement Ratio | Per 50kg bag of cement | By Weight, kg | By Number of bags | Sand, litres | Stone, litres |
| 1 | 1 | - | 0.25 | 12.5 | 1,005 | 20.1 | 697 | - |
| 1 | 1 1/2 | - | 0.28 | 14.0 | 810 | 16.2 | 844 | - |
| 1 | 2 | - | 0.30 | 15.0 | 680 | 13.6 | 944 | - |
| 1 | 2 1/2 | - | 0.35 | 17.5 | 580 | 11.6 | 1,007 | - |
| 1 | 3 | - | 0.40 | 20.0 | 505 | 10.1 | 1,052 | - |
| 1 | 4 | - | 0.53 | 26.5 | 395 | 7.9 | 1,097 | - |
| 1 | 6 | - | 0.70 | 35.0 | 280 | 5.6 | 1,167 | - |
| 1 | 8 | - | 0.90 | 45.0 | 220 | 4.4 | 1,222 | - |
| 1 | 1 | 2 | 0.30 | 15.0 | 550 | 11.0 | 382 | 764 |
| 1 | 2 | 2 | 0.42 | 21.0 | 425 | 8.5 | 590 | 590 |
| 1 | 1 1/2 | 3 | 0.42 | 21.0 | 395 | 7.9 | 411 | 822 |
| 1 | 1 2/3 | 3 1/3 | 0.48 | 24.0 | 360 | 7.2 | 417 | 834 |
| 1 | 2 | 3 | 0.50 | 25.0 | 355 | 7.1 | 493 | 740 |
| 1 | 2 | 3 1/2 | 0.53 | 26.5 | 330 | 6.6 | 458 | 802 |
| 1 | 2 | 4 | 0.55 | 27.5 | 305 | 6.1 | 424 | 848 |
| 1 | 2 1/2 | 3 1/2 | 0.57 | 28.5 | 305 | 6.1 | 529 | 741 |
| 1 | 2 1/2 | 4 | 0.60 | 30.0 | 285 | 5.7 | 495 | 792 |
| 1 | 3 | 4 | 0.65 | 32.5 | 265 | 5.3 | 552 | 736 |
| 1 | 2 1/2 | 5 | 0.65 | 32.5 | 255 | 5.1 | 443 | 886 |
| 1 | 3 | 5 | 0.69 | 34.5 | 240 | 4.8 | 500 | 833 |
| 1 | 3 | 6 | 0.75 | 37.5 | 215 | 4.3 | 448 | 896 |
| 1 | 4 | 8 | 0.95 | 47.5 | 165 | 3.3 | 458 | 916 |

**NOTES:**

1. The table is based on the assumptions that the voids in sand and crushed stone are 40 and 45 per cent respectively.
2. Air content of 1 per cent has been assumed.
3. For gravel aggregate decrease cement by 5 per cent, increase sand by 2 per cent sand coarse aggregate in proportion to fine aggregate in mix.

## MATERIAL REQUIRED PER m2 FOR VARIOUS THICKNESS

| Mix | Material | Thickness mm | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5 | 10 | 20 | 30 | 40 | 50 |
| 1:1 | C | 5.1 | 10.1 | 20.3 | 30.5 | 40.6 | 50.8 |
| | FA | 3.5 | 7.1 | 14.2 | 21.3 | 28.4 | 35.5 |
| 1:1 1/2 | C | 4.1 | 8.2 | 16.3 | 24.5 | 32.6 | 40.8 |
| | FA | 4.3 | 8.6 | 17.1 | 25.6 | 34.2 | 42.7 |
| 1:2 | C | 3.4 | 6.9 | 13.7 | 20.6 | 27.5 | 34.4 |
| | FA | 4.8 | 9.6 | 19.3 | 28.9 | 38.5 | 48.1 |
| 1:2 1/2 | C | 2.9 | 5.9 | 11.7 | 17.5 | 23.4 | 29.2 |
| | FA | 5.1 | 10.2 | 20.5 | 30.7 | 41.0 | 51.2 |
| 1:3 | C | 2.5 | 5.1 | 10.1 | 15.2 | 20.2 | 25.3 |
| | FA | 5.3 | 10.6 | 21.2 | 31.8 | 42.4 | 53.0 |
| 1:4 | C | 2.0 | 4.0 | 7.9 | 11.9 | 15.8 | 19.7 |
| | FA | 5.5 | 11.1 | 22.1 | 33.2 | 44.2 | 55.3 |
| 1:6 | C | 1.4 | 2.9 | 5.7 | 8.6 | 11.4 | 14.3 |
| | FA | 6.0 | 12.0 | 23.9 | 35.9 | 47.9 | 59.9 |
| 1:8 | C | 1.1 | 2.2 | 4.4 | 6.6 | 8.8 | 11.0 |
| | FA | 6.2 | 12.3 | 24.6 | 37.0 | 49.3 | 61.6 |

C = Cement in Kilograms FA = Fine Aggregate (sand) in litres
NOTE: No allowance has been made in table for bulking and wastage.



| Percentage of Stabilisation. | Ratio. | Size of Bricks. | No of Bricks/Bags of Cement. |
|---|---|---|---|
| 10% Cement Stabilisation | 1:10 | 290mm X 140mm X 50mm | 100 Nos 100nos Floor Bricks |
| 5% Cement Stabilisation | 1:20 | 290mm X 140mm X 100mm | 100 Nos. |
| 4% Cement Stabilisation | 1:25 | | 125/130 Nos. |
| 3% Cement Stabilisation | 1:33 | | 160 Nos. |

## CONVERSION TABLE (ft to mm)

| 4ft | 6ft | 8ft | 10ft |
|---|---|---|---|
| 1.219mm | 1.820mm | 2.438mm | 3.048mm |
| 12'0" | 14'0" | 16'0" | 18'0" |
| 3,660mm | 4,270mm | 4,877mm | 5,486mm |
| 20'0" | 22'0" | 24'0" | 28'0" |
| 6,096mm | 6,706mm | 7,315mm | 8,534mm |
| 30'0" | 32'0" | 36'0" | 38'0" |
| 9,144mm | 9,754mm | 10,973mm | 11,582mm |
| 40'0" | | 44'0" | 48'0" |
| 12,192mm | 12,802mm | 13,411mm | 14,630mm |
| 50'0" | 52'0" | 54'0" | 58'0" |
| 15,240mm | 15,850mm | 16,459mm | 17,678mm |
| 60'0" | | 90'0" | 100'0" |
| 18,288mm | 24,384mm | 27,432mm | 30,480mm |

**Materials**

| Particulars | Kg/cu.m |
|---|---|
| 1. Earth (ordinary) | 1600 |
| 2. Sand dry | 1600 |
| 3. Cinder (burnt coal) | 800 |
| 4. Surkhi | 1120 |
| 5. Cement | 1440 |
| 6. White lime slaked | 640 |
| 7. Brick Ballast | 1200 |
| 8. Stone ballast (Hard) | 1600 |
| 9. Lime Stone | 2400 |
| 10. Hard Stone | 2720 |
| 11. Sand Stone | 2240 |
| 12. Marble | 2560 |
| 13. Coal Dust | 960 |

**Works**

| Particulars | Kg/cu.m |
|---|---|
| Bricks masonry | 1920 |
| Sundried brickwork | 1760 |
| Reinforced brickwork (R.B) | 2000 |
| Lime concrete with brick Ballast | 1920 |
| Lime concrete with stone ballast | 2240 |
| Cement concrete | 2240 |
| R.C.C. | 2400 |
| Asphalt concrete | 2240 |
| Stone masonry | 2560 |
| Lime Mortar | 1760 |
| Cement Mortar | 2080 |
| Stone ballast consolidated as in Roads | 2080 |

| | | | | | |
|---|---|---|---|---|---|
| 14. Teak Wood | - | 640 | Granite ashlar masonry | - | 2560 |
| 15. Shisham Wood | - | 800 | Bubble stone masonry | - | 2320 |
| 16. Sal wood | - | 800 | | | |
| 17. Deodar wood | - | 640 | | | |
| 18. Cast iron | - | 7200 | | | |
| 19. Wrought iron | - | 7680 | | | |
| 20. Mild Steel | - | 7850 | | | |

| **Bituminous Substances** | | | **Building Materials** | | |
|---|---|---|---|---|---|
| Anthracite coal | - | 1,550 | kg/m³ Bricks | - | 1,600 to 1,920 kg/m³ |
| Peat (dry) | - | 560 to 640 " | Cement | - | 1,440 " |
| Charcoal (light) | - | 300 " | Chalk | - | 2,240 " |
| Coke | - | 1,000 " | Glass | - | 1,400 to 2,720 " |
| Graphite | - | 500 " | Limestone | - | 2,400 to 2,640 " |
| Crude oil | - | 880 " | Sandstone | - | 2,240 to 2,400 " |
| Pitch | - | 1,010" | Steel | - | 7,850 " |
| Coal tar | - | 1,010" | Timber | - | 650 to 720 " |

| **Excavated Material** | | **Structural Items, ceilings, finishes, etc** | |
|---|---|---|---|
| Clay (dry, compact) | - 1,440 kg/m² | Asbestos cement sheets 12to15.6 | kg/m² |
| Clay (damp, compact) | 1,760 " | Brick masonry | 1,920 " |
| Earth (dry) | 1,410 to 1,840 " | Brick wall, 100-mm thick | 192 " |
| Earth (moist) | 1,600 to 2,000 " | Brick wall, 200-mm thick | 384 " |
| Sand (dry) | 1,540 to 1,600 " | Brick wall, 300-mm thick | 576 " |
| Sand (wet) | 1,760 to 2,000 " | Cement plaster, 25-mm thick | 25 " |
| | | Concrete plain | 2,300 kg/m³ |
| **Liquids** | | Concrete reinforced | 2,400 " |
| Alcohol - 780 | kg/m | Galvanized iron sheet,0.56-mm thick | kg/m² |
| Gasoline - | 670 " | Galvanised iron sheet, 1.63-mm thick | 13 " |
| Ice - | 910 " | Mangalore tiles with battens | 65 " Kg/m2 |
| Water (fresh) - | 1,000" | Dry rubble masonry | 2,080 kg/m³ |



## RECOMMEND MIX PROPORTION FOR VARIOUS WORKS PER CUBIC METRE

| Nos | Work Description | Material Requirements. |
|---|---|---|
| 1 | (A) Wall Plaster 1:6<br>(B) MORTAR (1:6)<br>For Joining Walls | (A) 4 1/2 Bags of Cement.<br>(B) 76 1/2 Headpans of sand. |
| 2 | Concrete Flooring of Building 1 : 8 | (A) 3. 5 Bags of Cement.<br>(B) 38 Head Pans of Sand<br>(C) 42 Head pans of Broken Stone |
| 3 | Concrete Blinding & Slab | (A) 5 1/2 Bags of Cement<br>(B) 42 Head Pans of Sand<br>(C) 34 Head Pans of Gravel |
| 4 | Floor Screeding Plus D.P.C. 1:4 | (A) 6.5 Bags of cement<br>(B) 72 Head pans of sand |

## RECOMMEND MIX PROPORTION FOR VARIOUS WORKS PER CUBIC METRE

| | | | | |
|---|---|---|---|---|
| 1 | LATERITE ONLY (MUD) BRICK. | LOW GRADE. | NO CEMENT ADDED | Laterite soil only Block can be made used in dry season |
| 2 | LATERITE CEMENT WITH 3% CEMENT | FAIR GRADE. | 1:30 | Fairly Good for use |
| 3 | LATERITE CEMENT WITH 4% CEMENT. | GOOD GRADE. | 1:25 | Good and effective Compact & Strong |
| 4 | Laterite Cement with 5% Cement. | VERY GOOD GRADE. | 1:20 | Good for wall not to be plastered and Fencewall |
| 5 | Flooring - Laterite Cement (10%) Brick. | Paving Floor Grade. | 1:10 | Good for motor way |

### How to Lay Brick

1. Gather all the materials you need to start your project before beginning. when you have mixed the masonry cement and started laying brick, you have to use the mortar up and strike your joints before quitting.
2. Pour a concrete foundation if you do not have an existing slab, brick ledge, or footing to work on. This must be level and below the grade of the finished ground so that the brick is all you see when your wall is finished.
3. Layout the wall you are going to work on, and mark openings

like doors, windows, and any architectural appertanances you are including in your design. for beginners, a simple, square project like a planter box or mail box pedestal is best.

4. place brick along the length of your foundation in stacks you can reach easily from your work area.
5. Space "mortar boards" about every six feet along the wall, or on each side if the project is small. This will allow you to grab mortar our trowel as you work, and not have to move around too much.
6. Mix your masonry cement, or mortar. This can be done in a wheelbarrow for small projects, or a mortar box if you don't have access to a mortar mixer or cement mixer. Basically, to mix the mortar, you will use a ratio of three parts masonry sand(builders sand, if it is very clean), to one part masonry cement. Add water to the dry materials and mix to a consistancy like pudding. Too dry, and it will be difficult to "set" the brick in the mortar bed, too wet and the brick will sag.
7. Place a few shovels of mortar on each board, splashing the board first with water so the mortar "keeps", or stays wet enough to use.
8. Start at a corner, and using the trowel, scoop up mortar and place a 4 to 6 inch wide band on the footing or slab about 1 inch thick. set a brick down in this "bed" of mortar, and tap it down with the handle of your trowel, until it is level, parallel to the line of your wall, and the edge is plumb. Repeat with 6 or 8 brick, using the edge of the trowel to cut away the excess mortar that is shoved out from under the brick as you go.
9. Set another course of brick, starting at the corner, on top of the first course. if you are turning the corner you began at, you will set each course half a brick back from the previous course, so that each course is staggered half a brick. if you are turning the corner where you began, put the first brick in the first course so that it is square, and lay a few brick in this direction also.



10. Keep the height of the brick the same using a spirit or carpenter's level, and keep the end joints (head joints) equal. The standard bed and head joints are 3/8 inch, but this can be adjusted to your preference, up to 3/4 inch or even more.
11. Lay up several courses on each end of the wall you are going to lay first, these are the "leads", then you can attach a piece of builder's line at the top of each brick as you lay up the remaining brick in this wall, keeping them aligned and level.
12. Strike the head and bed joints with a "jointer" or "joint striker" when the mortar has begun to set. The jointer is a piece of tubing whose diameter is the same or slightly larger than your joint spacing, bent in an "s" shape. Hold the tool on one end, and rub it along the mortar joint between your brick with the curved portion of the tool to smooth out the mortar joint.
13. Brush the face of the brick with a "foxtail" brush to wipe away excess mortar and finish smoothing the joint. it takes a lot of practice to be able to tell when the mortar is set properly to strike and brush the joints, but basically, when it is hard enough to touch with your finger and not leave an impression, it is ready.
14. Continue laying the brick until you are level with the leads you laid up, then begin at the ends or corners laying either in another direction, or straight up with another lead.

TIPS

- Keep the mortar wet enough so it handles easily with a trowel, if necessary, adding water and mixing as you work.
- Do not mix more mortar than you need. Not only is it a waste, but the discarded mortar will harden when you clean out the mixing container, making it difficult to dispose of.
- Use a straight edge or level as you work along the wall to keep the brick work straight

- Look at finished brick to see the various architectural techniques used for bricklaying. This article doesn't cover all the possibilities, only the basic elements.
- If your wall requires cutting brick to fill spaces, you can cut them by striking them on the edges with a brick hammer or the edge of your trowel, but it is to lay out the wall so that it only uses whole brick for a beginner.
- Head joints can be adjusted, that is, made either wider or narrower to allow using whole brick

**Warnings**

- Mortar mix should be cleaned off skin if you come in contact with it. it contains lime, a caustic chemical which can cause burns with prolonged exposure.
- Do not breathe dust when mixing or handling dry ingredients. Brick Trowels

  Trowels are the most important and most used tools in brick masonry, and great care should be taken in selecting them. As with all tools, the mechanic should buy the best that he can afford. Better trowels are hand ground to the proper shape, taper and balance out of one piece forgings of high grade steel alloys. stamped, welded trowels are cheaper, but will readily wrap, wear down, and break. The mason will be money ahead in the long run by buying trowels that will give long and dependable service. Trowels are available in lengths from about 9" to 14" and widths from about 4 ½ to 7" and may be either wide heeled or round heeled. Again, the type of job and personal preference will determine what sizes, shapes and lift to buy. Fig. 3-2 shows. some typical brick masons' trowels

**Jointers**

A jointer (also called joint tool or finishing tool) is used to



"finish" the mortar joints between the units in a masonry structure. Finishing the joint smooths and compresses the face of the joint, giving a pleasing appearance and, as will be discussed later, assures water tightness of the joint. Jointers are usually either cast or forged metal rods, or stamped split tubes with the ends rounded or angled to provide a particular shape of convex joint. For long horizontal joints, a joint runner (sometimes called a "sled" runner) is recommended. Fig. 3-3 shows some typical jointers. Fig. 3-4 shows the joint or sled runner being used in laying concrete block.

Jointers. Regular jointers (tops) are used to finish mortar joints in most brick work. Longer jointers,
called sled runners (bottom) are used to finish long horizontal joints. (Goldblatt Tool co.)

**Brick Bond**

The strength of any masonry wall depends to a great extent upon the bond used in erecting the wall. Bond in this sense, refers to the arrangements of brick or stone in the wall. The arrangements are designed to prevent the vertical joints between the masonry units from being directly above each other. There are many patterns for placing brick which will produce a structurally sound wall. The various bonds is

brought about the distribution of stretchers (the length of the brick laid parallel with the face of the wall) and headers(laid with the length at right angles to the face of the wall) laid in various courses (rows).

The following paragraphs list some of the basic bonds used in brick work.

Running or stretcher Bond. (see Fig.5-19A)This bond uses stretcher courses with the joints breaking at the center of each brick immediately above and below. Face, building, Roman, or SCR brick is used for this bond.

Common Bond. (see Fig. 5-19B.)The common bond, or American bond as it is sometimes called, is a variation of the running bond, with a header course every 5th, 6th, or 7th course This ties the wall to the backing masonry material. The header course are centered on each `other. face or building brick is usually used in the common bond.

English Bond. (see Fig. 5-19C) Alternate courses of headers and stretchers are laid so the joints between stretchers are centered on the headers.

Stretchers are centered on stretchers; headers on headers face or building brick is usually used for the English bond.

English Cross or Dutch Bond. (see Fig. 5-19D) This bond uses alternate header and stretcher courses. The joints of the stretchers center on the stretchers two courses above and below; headers center on headers. This bond is usually building or face brick. Flemish Bond. (See Fig. 5- 19E) Alternate headers and stretchers are in each course. The headers in one course are centered above and below the stretchers in the other course. face or building brick is used for this bond.

Stack Bond. (See Fig. 5-19F) All courses are stretchers and all joints are in line. This is used primarily for aesthetic purposes- it has relatively little structural value. The most effective brick for this type of bond is Roman.



Many of the more ornamental bonds have been excluded from this discussion- they are seldom used because of the cost.

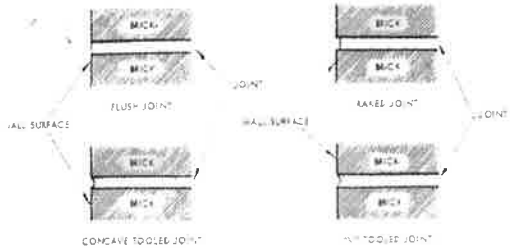
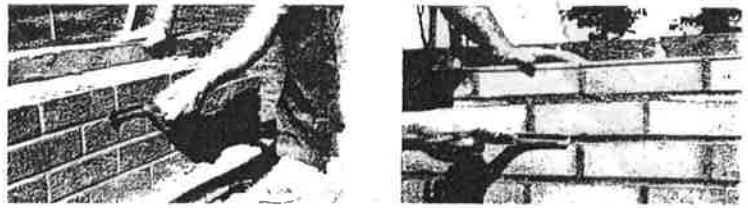


Fig. 5-17. Types of mortar joints.



Left: V joint. Right: Concave joint. (Brick Institute of America)

**IMPORTANCE OF ESTIMATING QUANTITIES.**

We are not dealing here with cost estimation. The cost of material very too much make it accurate.

Estimation of quantities is a simpler way to calculate a first estimation of the quantities of material needed for masonry building.

**Estimation of quantities allows:**

- Better cost estimation. Therefore better benefits estimation and less more loss risks.
- Delivery planning, preventing shortage of material on site and delay.

**WHAT IS TO BE ESTIMATED:**

Everything that is used as building material is to be estimated. Every component of every element
of the building is to be detailed. in this book we will only speak about masonry work.

- Bricks
- Blocks(its component, cement, soil, sand, in case blocks are made on site)
- Mortar(its component, cement, soil, sand)
- Iron(in case it is used for reinforcement)
- Concrete blocks( in case it is used for foundation)

WASTE must be taken in account. it depends of the quality of bricks and blocks, and of the care
of the bricklayers. We can say as first estimation:

- For bricks and blocks:15%
- For Mortar: 30%

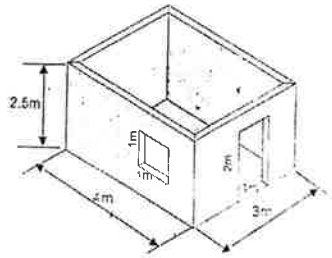
**HOW IS IT ESTIMATED:**

Quantities are calculated per square meter of wall. Therefore must be done a quick calculation of
the area of all the walls.

-One way is to calculate the area of the openings and to remove it from the area of the walls

-A simpler way is to assume that the wastes may be more or less equal to the window area,
therefore not taking count of the window area.

Example
Area of walls
(4+3+4+3)x2.5= 35m2
Area of openings:
1x1 + 1x2 3m2
Area of brickwork=
Walls - Openings = 35 - 3+=32m2






**ANSWERS TO THE MOST ASKED QUESTIONS ON THE TECHNOLOGIES OF EARTH, CEMENT- EARTH, CONSTRUCTION AND FIBRE CONCRETE ROOFING TILES/SEMI-SHEETS PRODUCTION AND USES.**

Q.1: What is Earth? Why do we need Earth for construction in these modern day?

Ans: Earth that is used for construction is called Mud or Laterite soil or Red Filling sand. It is a soil rich in Gravel, Sand, Clay and Silt and it can be used if very well compressed to build durable, strong and weather resistant building. It is recommended as best for use in the tropical countries of the world because its use will make a house cool. It is the commonest soil in the tropics and this makes it cheap to obtain, thereby reducing the cost of a building. It is not compulsory to use cement with Mud or Laterite that is equally called Earth.

Q.2: Where is this technology from and why is it just being introduced now?

Ans: This is an old technology that has been practiced in Nigeria and Africa, but then it use to be hand made into Mud Blocks using wooden mould and the resultant production was assumed not to be too strong and was jestitioned at the advent of Concrete Blocks technology. However, it is being revived because of the high cost of cement and the improvement/availability of mechanical presses that can make better, stronger Mud Block/Brick with or without little cement.

Q.3: Where can one obtain Earth called Laterite or Mud for use? It is not available in my village or town?

Ans: Laterite called Mud or Earth is a tropical Soil available throughout Nigeria and Africa. It can be dug up from the building site and it can be ordered from burrow pits where all Tipper lorries operators can collect from. It is the commonest soil and it is cheaply available.

Q.4: How can I identify Laterite soil called Mud or Earth?

Ans: This is a soil that is reddish, brownish or darkish in colour. If you take any soil in your hand and add a little water to mould it into an object, If it can form a ball etc, it is probably likely to be Laterite, Mud or Earth.

Q.5: We are told one can build his house with Laterite or Earth called Mud, but we are also told that houses built like this in the past do collapse and go into ruin, wouldn't there be a repeat of this?

Ans: The Mud houses that were built in the olden days do collapse and go into ruin for reasons that (a) they never have good foundations (b) they never have D.P.C interpreted as " Damp Proof Courses". (c) they never have good roof (d) they never have good drainage. In short, our forefathers lack the technologies of good building practice and these are some of the reasons for the collapse of their buildings. With modern building practice, regulations and application of the rules, collapse have become a thing of the past.

Q.6: Supposing I want to add Cement to my Earth, Mud or Laterite, is this possible and how much percentage is recommended?

Ans: It is possible and easy to add Cement to the Laterite soil called Mud or Earth. The percentage recommended varies between 3% and 10% cement. However, I wish to guide you further as follows: The (3)three classifications below are the ones recommended for Low Cost Housing:-

| GRADE. | PERCENTAGE. | R A T I O . | USEFULNESS. |
|---|---|---|---|
| C. | 3% | 1:30 | Fair |
| B. | 4% | 1:25 | Good |
| A. | 5% | 1:20 | V.Good |

Q.7: I have found some people adding grasses to their Mud Brck/Block materials before moulding, why is this so?



Ans: Grasses added to Mud before moulding into Bricks or Blocks are to stabilize the Mud Brick/Block. They help to prevent the Brick/Block from developing cracks during drying as they act as re-inforecment in the Brick/Block.

Q.8: Can I add clay to my Laterite or Mud called Earth to make it stronger?

Ans: There may be no need to add clay to your Laterite as Laterite essentially contain some clay, however, if a test carried out shows that your Laterite does nnot contain enough clay you can add some.

Q.9: How much clay is enough in my Earth/Laterite/Mud for good building construction?

Ans: Laterite/Earth that contain about 10% to 30% clay is good for building construction.

Q.10: What is the disadvantage or advantage if I do not use cement in my Mud/Earth Brick?

Ans: A major disadvantage of non using Cement in your Earth Brick is that you cannot mould your Mud/Earth only Bricks/Blocks in raining season and you may not be able to leave the building unplastered as it will be affected by rain/weather. Advantage of not using Cement is that you save a great sum of money that can be used for other purposes in the building if you do not put cement in your Mud/Earth Bricks.

Q.11: Is it a must to sieve my Laterite soil/Earth before making use of them to mould my Bricks/Blocks?

Ans: It is not actually a must, as we have some Laterite that require no sieving and you can actually look for this if you will have to save time in Labour for sieving. However, all Roots and Plants and Impurities in Laterite/Mud/Earth must be removed before use.

Q.12: What type of Bricks/Blocks can be made using Earth/Mud/Laterite soil?

Ans: To construct walls in building, the types of Bricks/Blocks that is possible are numerous. The following are major

among them:-

(a) Cinva Ram Bricks of size 290mm x 140mm x 100mm.

(b) Liquid Mortar Bricks of size 300mm x 150mm x 100mm.

(c) Dry stacked interlocking Block of size 230mm x230mm x 120mm.

All these can be with or without Cement stabilization.

Q.13: How are Interlocking Brick/Block used in housing construction?

Ans: Interlocking Bricks/Blocks as their name indicate are Bricks/Blocks that are designed with interlocking features which enables the Bricks/Blocks to be fitted to themselves without the use of Cement –Sand mortar.

Q.14: What is the guarantee that Buildings constructed with Interlocking Bricks will not collapse since no mortar is used to hold the Bricks/Block together?

Ans: There are built-in security devises that are incorporated into the interlocking Bricks /Blocks constructions that enable the house to be firmly held together. Such devices are in the top. bottom, left and right sides of the Bricks/Blocks that tightly fit and enter them into one another. There are equally window frames, door frames and ring beams both at lintel and head course level that offer restrictions to any movement in the building.

Q15: Which of the Bricks/Block s types are to be preferred for building construction?

Ans: All the Bricks/Blocks types are to be preferred to the degree to which you understand the technologies. It is however advised that because our builders/ bricklayers only will understand the Cinva Ram type of Brick with size 290mm x 140mm x 100mm for buildings constructions. about 90% Nigerians have patronized it for building.

Q16: I am interested in using the Interlocking Bricks/Blocks in my construction. How can I go about this?



Ans: Users of this technology needed to do a simple study or employ a Supervisor / Builder that is used to Interlocking Brick construction.

Q17: Why cannot Earth called Mud or Laterite be used to make bigger Blocks such as 18" x 9" x 9" or 18" x 6" x 9" Block like the sandcrete/ Concrete Blocks?

Ans: Researchers throughout the world have confirmed that the sizes of Bricks/Blocks made of Earth called Mud or Laterite soil are to be smaller than those for sandcrete/concrete blocks. The reasons cannot be far fetched from the fact that materials composition of earth especially the clay content only allow such Brick/Block to be compressed as against vibration for sandcrete/concrete Blocks. It is also to be noted that bigger Mud/Earth Block will be too heavy to manipulate in building construction. Wooden pallets permitted in sandcrete Block production cannot be used in Mud/Earth Block as they get destroyed in constant compression.

Q18: Can buildings of Earth/Mud/Laterite soil be plastered with Cement –Sand mortar?

Ans: Yes, plastering in Cement –Sand mortar is possible. It is pertinent to mention that any material including Earth/Mud/Laterite soil that have sand as it's major component will work perfectly with Cement as they are in the same group.

Q19: But Bricks of Earth /Mud/Laterite soil are very small and may require too much mortar to join them into walls. Can this produce a cost reduction in building that is worth my consideration?

Ans: The size of these Bricks/Blocks of Mud is standardized, they are not too small, infact, they are the biggest sizes of Bricks/Blocks that is adopted in places such as Germany, France, U.K, Ghana, India, Australia, Belgium, U.S.A., South America to mention just a few places. To the question of

too much joints that can lead to too much cement mortar requirement, this is ABSOLUTELY WRONG as the Bricks/Blocks require only 10mm thickness of mortar for joining instead of the 25/30mm thickness of cement mortar required for concrete/sandcrete Block.

Q20: Can our Bricklayers lay these Bricks or do we require a specialist to lay the Bricks/Blocks?

Ans: Bricklayer/Masons every where in the world including Nigeria follow the same principle and technique and any practitioner will lay the Bricks/Blocks. However, if the Brick walls are not to be plastered, we will only recommend the employment of experienced bricklayer/mason that have handled such works before so that the building can be presentable and neat.

Q21: What is the compressive strength of soil-cement block (landcrete)?

Ans: This question is often asked, but I must say that several factors do contribute to the above e.g. quantity of cement used, curing method and duration, effectiveness of the compressing Brick Press and quality of Earth among others. The minimum wet compressive strength adequate for a single or two storey building is about 28kgf/sq.cm and it is noted that most sample of Mud-Cement Brick from Cinva Ram Brick Presses have up to 29kgf/sq.cm with some being higher and averaging up to 50kgf/sq.cm.

Q22: Any known problem about the structural performance of Mud-Cement of Earth Bricks?

Ans: Generally No problem have been known about structural performance even when construction work is not properly monitored. Landcrete Brick is fire resistance, air and water tight, possess a thermal conductivity that is acceptably good.

Q23: What is the life span of a Building built with



Mud/Earth/Laterite Soil-Cement?

Ans: There are instances of Mud Brick/Block houses that have existed well over 60 years. In short it is estimated that if the house is well built with all the structural work e.g. Foundation, DPC, and Overhanging roof, a soil/earth/mud brick house will last as lifetime.

Q24: Is it possible to paint directly on mud-cement brick house?

Ans: It is possible to find Red colour Laterite soil that may not require plastering or painting. However, there is a red paint that can be applied for a long lasting effect. Equally a soil cement brick house have been known to receive emulsion paint directly and giving a good look.

Q25: What is curing and why do we need to cure mud-cement bricks?

Ans: Curing is the process of wetting with water all Blocks/Bricks that is Cement stablised, this same thing is done with sandcrete/concrete blocks. Cement based blocks must be wetted for a minimum of 8 days and left under polythene cover, this enables the Blocks to attain adequate strength. Cement stabilized Blocks that are not wetted/cured may be weak and full of cracks and the owner may loose all the money used for buying the cements.

Q26: I have noted that the plastered face of some mud Brick houses in our villages/towns do fall off after say 5 to 6 years of plastering. Why is this so?

Ans: The case of falling plastered cement rendering from faces of Mud walls is common in houses/huts that lacked DPC (Damp Proof Courses). DPC is a layer of membrane rich cement mortar on top of the foundation of houses. This course or membrane is introduced to stop ground water in flooded periods from rising in the mud wall. As the affected house do not have DPC, water usually go up and

down yearly in mud walls to the detriment of the union between the walls and the plastering materials. Introduce DPC on good foundation and you will have stopped a falling plaster.

Q.27: In the making of cement stabilized soil bricks, how much water is needed to be added in the mixture before filling into the Bick Press?

Ans: In wetting of Cement –Soil for use in the Brick Press, a wetting can is to be used to shower water lightly on the mixture. The mixture is properly turned over about four (4) times. A mould is then hand made by squeezing in the Palm of your hand some earth and dropped from 1.0 metre high on a hard ground, if the lump break into 3 (three) smaller lumps, then the water is enough.

Q28: I know only Fired Clay Bricks, can this Mud / Earth/ Laterite soil Block/Brick be fired after moulding?

Ans: No, there is no need to fire a Mud/Earth/Laterite soil Brick since it can be dried by the sun, the type of Bricks that are fired is that made solely with clay, the type used in making pots. Laterite soil/Earth/Mud is a sandy soil that contain some clay, it is not a clayed soil.

Q29: What size of sieve is adequate for use in sieving Laterite/Earth/Mud soil?

Ans: It is advisable to use a 6mm size or 10mm size sieve that is available in Iron Market. It can be framed in wooden plank as in the Technical Manual supplied with Brick Press.

Q30: What other tools or instruments do I need for use on a Laterite/Earth/Mud Soil Block moulding site?

Ans: Head Pan/s, Wheel barrow, Shovels, wetting can , Buckets, Used engine oil, Wooden platform for Brick Press, a simple shed/shade for the workmen, a sieve, oiling brush, etc.

Q31: Do we need Pallet to support Bricks like the sandcrete Blocks?



Ans: Certainly No. Laterite soil/Mud/Earth Bricks do not require pallets as in Concrete Blocks/Sandcrete Blocks

Q32: What is the life span of the Brick Press? How durable are the machines and what is the maintenance requirement?

Ans: Our brand of Brick Press whose original design we got from Germany is ruggedly built to resist abuses, thus preventing damage due to overloading. It is guaranteed with a life of 10(ten) years with minimal maintenance. Daily oiling of moving parts with used engine oil will elongate the life of the machine. We will receive the equipments back in any of our offices and we can refurbish same at moderate cost for our customers if a major repair is required after several years usage.

Q33: Any guarantee on the Brick Presses offered by your company?

Ans: Yes, we offer a 12 months guarantee against all defective manufacture. Such Brick Presses should be returned for exchange for a new one or repair of the defective parts.

Q34: How can I install the machine for use. Can your men assist me at installation?

Ans: A manual on how to install the Brick Press is available free to all customers and our technical crew will lecture customers on installation methods. However, if a customer insist on our men installing the Brick Press-they should be ready to bear the cost of transportation, accommodation (if required) and installation/supervision charges that can be quoted on request.

Q35: We are told of some accessories available with the Brick Press. At what cost can I get a complete set?

Ans: Buyer of our Brick Press will be privileged to collect the following as part of their package:-

(a) A one hour video cd on the Technology.

(b) An operator's manual.

(c) A frog faced wooden pallet.
(d) An oiling brush.
(e) Holding down Bolts (4Nos).
(f) Half Brick Metal
(g) Lintel Wooden Pallet
(h) Floor Wooden insert.
(i) Soil Scoop.
(j) Soil scrapper.
(k) Sample Interface Sheets.

Q36: Why are the Brick Presses all manually operated and not electrically or hydraulically operated? I prefer any of the later because I believe manual presses will be difficult, energy sapping and time wasting in their operations.

Ans: Our level of development dictates that only manual/mechanical presses are to be recommended and preferred. Electricity is not constant or regular, fuel supply is not stable, prices are rising and availability is not guaranteed. Talk about maintenance / repair, we do not have trained artisans and mechanics to handle hydraulic and electrically operated presses. The cost in foreign exchange is very high.

The prices of these manual presses ranges from N50,000.00 to 120,000.00 Naira whereas the Electrical / hydraulic presses cost about $ 45,000 US Dollar or approximately N7,000,000,00. On the issue of difficulty in operation, energy sapping and time wasting, we wish to say that Brick Press operation is a technique that when mastered is not difficult neither is it energy sapping. It require no brute force to operate rather it is a system, very simple especially if the Brick Presses are very well lubricated. As for time wasting, Brick making when well organized, supervised and mastered by their operator, it is highly rewarding and fulfilling, Lots of Bricks are also



capable of being made. A person, group or business needing to make lots of Bricks say 2000 to 5000 Bricks per day can do well to acquire 4(four) to 10(ten) Brick Presses for N90,000.00 to 120,000.00 each and the volume is guaranteed with adequate labour and supervision.

Q.37: How many number of workers do I need for Brick making on my site.?

Ans: A minimum of 2(two) persons are recommended even tough one person could successfully carry on Brick making. Appropriately, for a continuous operation of the machine a 3 (three) men crew is recommended.

Q38: What is the compression ratio offered by the Brick Presses?

Ans: Our Cinva Ram Press has 1:155 compression ratio while the dry stacking interlocking brick press has 1:1.65. We can also produce a Brick Press with double compression to give 1:1.88 compression Ratio.

Q39: Why is it that great efforts are sometimes required to eject the Brick/Block from the Brick Press?

Ans: Simply, when the Brick Press is overfilled with Mud-Cement materials or when the Mould Box internal is not oiled to prevent Mud-Cement Brick /Block from glueing to the mould surface and lastly, when the track where the piston travels is too dry, it will be difficult to eject the Brick/Block. Operators are advised to oil frequently and avoid overfilling of the mould box(es).

Q40: How can one Brick Press be used to make different types of Bricks as in your Multi-purpose presses?

Ans: Bolyn Brick Multi-purpose Presses are capable of being used to make different types such as Solid, Lintel, Wall Fencing Cap (Coping Brick), Half and Flooring Brick/Block because we supply users with metal and

wooden pallets that are introduced into the Brick presses to create or stamp or divide the original Brick/Block to the new type desired.

Q41: How many Bricks/Blocks of the size 290mm x 140mm x 100mm can one produce from a 50kg Bag of cement?

Ans: The number of Bricks/Blocks that we can produce from a bag of Cement will be as follows:-

Grade A = 1:20 = 100 Bricks/Blocks
" = 1:25 = 125 Bricks/Blocks
" = 1:30 = 150 Bricks/Blocks

Q42: Why should I buy a Brick Machine because I needed to build a house as this machine will be useless to me after building the house?

Ans: It is narrow mindedness to assume that you only want to build one house. It has been found that people needed to build some other structures as additional in the house in future, a country home, relations and friends could be beneficiaries while it can also create jobs for someone. Don't think too much about the present or yourself alone, be broad minded. You can use ii for fence wall brick, fish pond, flooring bricks etc

Q43: Can I use the Brick Press to mould sharp sand and cement Blocks if needed?

Ans: Yes, this is a possibility even though it is going to defeat the original purpose for which Earth called Mud was adopted e.g. cost reduction, availability, ease of moulding, less quantity cement etc.

Considering that there are already lots Block vibrating, machines in the market, using brick upress for sand crete block moulding is not advisable.

Q44: Can Earth/Mud/Laterite Soil-Cement Block/Brick be used to build upstairs/Multi-storey buildings?

Ans: Yes. It can be used, it has been used. The technology of upstairs and multi-storey building demand that a



structural frame work should be designed by a Civil/Structural Engineer and once the colums, beams, slabs of re-inforced cement concrete, steel structural work etc. are in place, then any materials e.g. Bricks/Blocks, Glass, Wood, Metal, Aluminium can be used to build. In most cases these materials mentioned act as partitioning materials. A Boy's Hostel of Babcock University was built using Mud-Cement Bricks/Blocks and it is a multi-storey (upstair) building.

Q45: Are Mud Brick that is Cement stabilized good as foundation materials?

Ans: Mud-Cement Bricks are not foundation materials, they are to be used above DPC, so that they are above water level. Those who used it underground in Ghana do plaster the Bricks in the foundation, this we believe may not be necessary as we can adopt what is conventional in our locality.

Foundations should not be compromised.

Q46: How many number of Bricks are required to build a one room house?

Ans: Below find the approximate number of Bricks required per room:-

(a) Cinva Ram Brick = 1000 Bricks.
(b) Liquid Mortar Brick = 1100 Bricks.
(c) Dry Stacked Brick = 1200 Blocks.

When the Nos of rooms to be built increases, then the number of Bricks required for use decreases since some rooms share the same wall with one another.

Q47: What is the price of a 3 (three) bedroom house?

Ans: There is no universally known single answer to this question because the designs, the materials specification. conveniences, localities etc.

will differ from person to person. The cost and price of all variables-Labour, Cement, Soil, Wood, Services etc also

differ. It can cost N1,500,000.00 to N2,000,000:00 depending on design and specification.

Q48: Can these Bricks be used for a living accommodation or what type of a building can one use the Bricks for?

Ans: Bricks have been used for all types of buildings from time immemorial and there is no restriction on the type, storey or size of building. It is a universal building materials acceptable throughout the whole world for building all habitable structures.

Q49: What is the involvement of or the acceptance given to Mud Bricks Building by the Nigerian Institute of Architects?

Ans: All over the world, Architects and the Nigerian Institute of Architects known, accept Mud Brick as a unique, alternative building materials that is acceptable, know; used and loved. No wonder for 2(two) consecutive years in 1995 and 1996 we won the Best Award in the promotion of the technology during the Nigerian Institute of Architect's Exhibition. Several notable ones among the Nigerian Architects have recommended it, some have bought the machine and used the technology.

Q50: How many Bricks can I get from a 5 cu.yd or 5 tonnes. Tipper lorry?

Ans: A 5 cu.yd Tipper lorry that is 5 tonnes will deliver to you Earth/Laterite soil that will produce 500 Bricks.

Q51: What is the difference between a hydraulic and manual brick press?

Ans: A Hydraulic press can produce brick of higher strength, the press are valued more than 60 times the manual type. The manual brick press are very suitable for up to 2 storey construction as they provide durable, strong bricks that are acceptable in building construction.

Q52: What if the house built with cement laterite Soil/Mud is left for some months/year without roof? What will happen?



Ans: Once you cement stabilized your Mud/Laterite soil Block before use in your building, you have a guarantee that the house so built with these Bricks cannot collapse, fall or be washed away like the ordinary Mud House if it is not roofed immediately. It is however a wise choice to always roof your house not too long after construction.

Q53: Can I use the Brick Press to make Floor Block or Paving Brick/Stone?

Ans: Yes, the Cinva Ram Brick Press is supplied with floor wooden insert that enable you to make paving Bricks or Floor Blocks.

Q54: Why is the Nigerian Government, state and Local Government not adopting the use of these technology if it can bring down cost of house?

Ans: We have never had a people oriented government in recently Nigeria recently most of the government officials do not like anything to be cheap, if it is cheap then, there will be nothing in it for them. Remember, individuals go there to amass his/her own wealth and get pushed out.

Q55: Can I make the Mud/Laterite Soil/Earth Bricks in the Rainy season?

Ans: If Cement is to be added it could be made in the rainy season only, Mud only Brick must be made only in the dry season.

Q56: Can you help to mould the Bricks and Build the House yourself since I have no time?

Ans: You cannot talk about low cost or cheap price once you involve a contractor that must make his profit on materials, labour machinery, transportation etc. the house may not be low cost eventually. Build your own house please.

Q57: I want to make Bricks for sale on my site. What is your advice?

Ans: Bricks are very heavy and a lot of cost will be added due to

loading, offloading and transportation cost, from site to site. Our candid advise is that your site should have a structure built with the materials such as the site office and sample of the products should be available for purchase in smaller quantities. If and when large orders are received it will be best if the Bricks moulding operation is shrifted to the site of the customer. This way there will be no heavy transportation cost incurred.

Q58: How much capital do I need to establish a Brick Moulding small scale business?

Ans: N250,000:00 to N300,000:00 will be required to enable you handle a project that require that you must have at least 10,000 Bricks in stock at any particular time.

Q59: What percentage(%) savings can this Bricks bring on my walling structure?

Ans: Savings of up to 50% is possible if you intend building a Mud Brick house, however, it will be about 20 to 25% if you are considering a Mud-Cement Brick house.

Q60: Who can help me draw up a feasibility studies. I needed one?

Ans: A feasibility study can be undertaken by our company (if) you desire one. It will cost you N20,000:00 (twenty thousand naira only). We will however need from you the current prices of A 5 CU.YD Tipper Lorry of Laterite soil, sharp sand, soft plastering sand, used engine oil, 4000 litres of water, a bag of cement etc. in your city, town or village.

Q61. Is there any instalmental payment arrangement for low income earners who are unable to afford a one time outright purchase of the Brick Press?

Ans: Yes, there is a system whereby a customer can make a deposit and plan a programme of payment over a period of time for the liquidation of the balance sum. However, the equipment/s is /are only to be released to the



customer on completion of payment.

Q62. What about a Hire-Purchase terms, does this apply in your company?

Ans: Certainly No. We are unable to afford to give away any of our equipments to anybody on a hire –purchase term.

Q63: Can your company subsidize the equipment cost, I mean, can you reduce the cost drastically for the low income earners or poor?

Ans: Our company is a small scale enterprise that ought to get government subsidy, encouragement and assistance but it is sad that none of the governments at the local, state and federal level are alive to the duties of encouraging indigenous and creative enterprises especially in housing delivery that is supposed to be one of the most important duties of the government. For this and other reasons too numerous to caption here, it will be difficult if not impossible to contemplate subsidy and price reduction (if) we ourselves must survive and continue to be in business.

Q64: Can you deliver the machine to me in my town (if) I make payment to you through your nominated bankers?

Ans: Yes, we have been doing this. However client must be ready to bear the cost of transportation. The price of transportation is high, but we hope to use our experience to find the best means and price of transportation that will be communicated to the client when he/she is ready for the transaction.

Q65: Who are your bankers and how do you prefer we send the money for the price of the equipmenjt plus transportation cost. How much is transportation cost?

Ans: Presently, we operate account with Zenith Bank Plc. And we will advise that customer contact us at the time they are ready so we can give them full details of our account. Cost of transportation differ from place to place, but

ranges between N2,500.00 to N1000,00 for the Brick Presses depending on the Brick Press type and destination. E.g Lagos South West, South East, Middle Belt, North East, North West An idea of the prices for these area are:

| | |
|---|---|
| (a) Lagos | Brick Presses N1,000 to N3,000 |
| (b) Western States | N 3,000 to N5,000 |
| (c) Eastern States | N 6,000 to N10,000 |
| (d) Far Eastern State | N8,000 to N10,000 |
| (e) Middle Belt State | N 8,000 to N10,000 |
| (f) North West State | N 10,000 to N 12,000 |
| (g) North East State | N 10,000 to N 12,000 |
| (h) Abuja FCT | N 6,000 to N7,500 |

These are the estimate d cost of transportation within Nigeria.

Q66: Do you have any after sales services and where can we obtain these services?

Ans: You can obtain our after sales services. Only at our Lagos and Kaduna offices clients are encouraged to call or visit any of these offices to lay their complaints, to get their equipment spares or repairs or exchange. We will be pleased to be of assistance.

Q67: How can I install the machine or will you send your engineer/technician to assist me?

Ans: An operation manual is available and supplied with every equipment purchased from our company. We equally will supply our client with a one hour video cassette on the technology of Mud Brick and the use of equipments. At the point of purchase we also will give buyers practical demonstration/training on the installation, use, maintenance etc. of the equipments. We urge every buyer to avail themselves of this opportunity. However, should



any client prefer the engagement of our engineers or technicians, we may be able to send one for 2days. The client however, must be prepared to foot the following bills:-

(a) Allowances to trainer =N5,000:00
(b) Cost of Transportation (to & fro = As applicable)
(c) Accomodation = As applicable
(d) Any other incidental cost

Q68: What are the prices of the equipments and the delivery schedules?

Ans: Prices can be obtained by phoning to request same from 08037792569 as this is subject to changes. However, with advancement in technology, that makes it possible for a client to pay in one town and for the fund to be received in our account within 24 hours. We are able to deliver the machine (if) it is the regular types within 48hours of the receipt of the fund. However, any special order will be delivered in 2 weeks. In both cases, the specific timing will be given to you when you are placing the order.

Q69: Can your company give me one of your trained men to make my Bricks for me?

Ans: There is no way that we would be able to do this since we do not have an employment agency in our company.
We have sold thousands of machine to all parts of Nigeria and West Africa. We will not be able to supply operators to all our customers, however, the best thing for all to do is to find some unemployed youth that can be recommended to you from the locality where you are planning to use the Brick Press. It will be easy if you contact residents, landlords and your relations around to find employable youth. There are certainly, a lot of our youth that are ready to work to earn a living. Give them a chance.

Q70: We are one of your customer/s who bought one of your equipments some years ago. We lost some of the parts and accessories, can you replace them and what cost?

Ans: We can replace, repair any parts or accessories for our Brick Presses. Please visit any of our centers in Lagos or Kaduna and make your order. The officers will quote for the items and provide them to you.



## ACKNOWLEDGMENT

We acknowledge the following listed publications and other diverse sources as our references. We do not lay claim to being the source of any or all the contents of this book we facilitated the compilation for the benefit of the general public, in view of the non-availability of titles in bookshops and liberalities in Nigeria

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2. Designs and estimate for a 2&3 Bedroom house by O. AYO ADEBANJO.
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5. Masonry simplified volume 1. by J. Ralph Dalzell and Gilbert Townsend. Building with Laterite is cheaper.
6. The Punch Newspaper of Monday July 31st, 2006
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