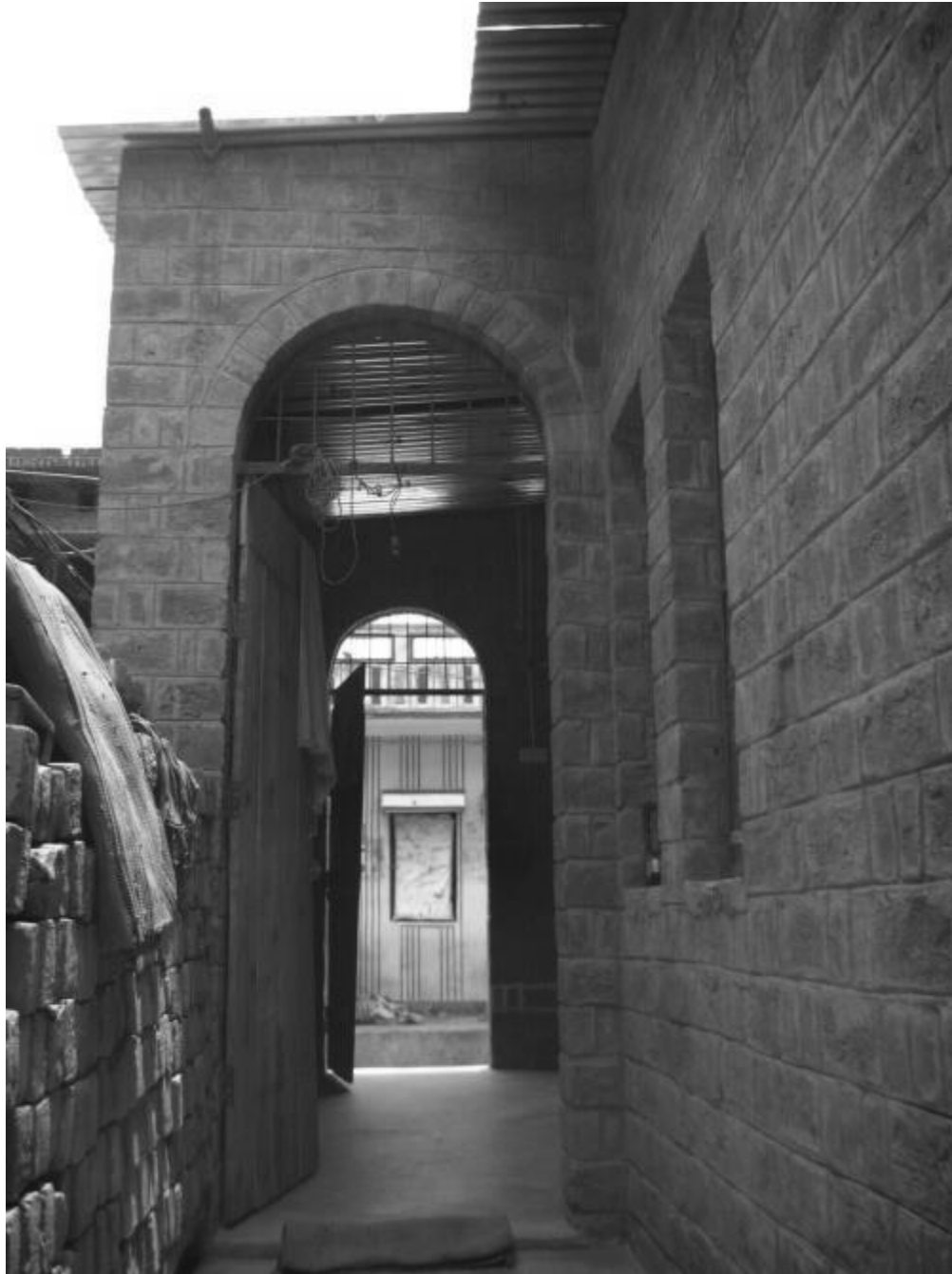


## **Step towards Safe & Climate Friendly Home**

(Demonstration of climate friendly low cost model house for poor and vulnerable community in Mahewa ward, Gorakhpur under Micro Resilience project, ACCCRN)



Prepared by  
SEEDS India

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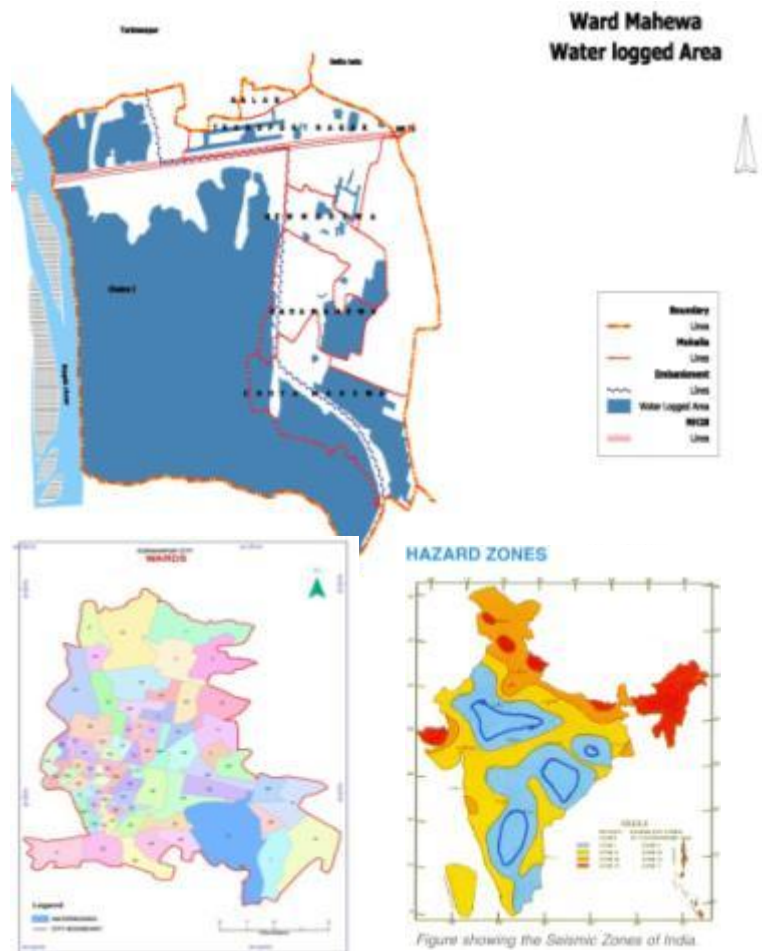


## Introduction

Location details: the project “Urban Community Based Micro Resilience Model of Ward exposed to Climate and Hydro-Meteorological risks” of ACCCRN was proposed in the Mahewa ward of Gorakhpur city to develop a community resilience models to climatic hazards. Mahewa ward has population more than 12,000 and spreaded over 2.87 km. River rapti flows in the west. The significant portion of the ward is low lying and prone to water logging during monsoon. Large sections of the community are from marginalized and poor socio economic background. Thus these poor people are more vulnerable to these climatic hazards and its impact.

**Community Profile:** the mahewa community has six habitations namely bada mahewa, chota mahewa, galan, new Mahewa colony, transport Nagar and Chakra. Almost all the habitations face water logging problems during monsoon.

All the majority communities are poor and socially and economically backward. The main occupations are laborers in unorganized sectors, unskilled workers, small vendors and farmers. The majority of the community belongs to lower caste like Nisad, Chamar, Harijan, Chauhan etc.



## Key achievements:



- 1. Lack of knowledge of technology encourages the habit of inappropriate constructions with thermocole, polythene sheets, asbestos etc. which further pile onto the risks on the lives. Intervention of easy technologies will ensure adaptation/replication for people to afford safe houses.**
- 2. The rat trap bond makes the house more climatic resilient which provides people with comfort living in extreme weather and further reduces environmental impact by dipping dependability on other energy sources. Rat trap reduces the cost of wall by 26% and also allows savings on material, variably minimizing the environmental impact.**
- 3. The intervened low cost demonstrates house constructed in rat trap bond technology which not only reduces the cost as compared to conventional brick techniques but also gives a avenue to the desires of the poor people to have a safe house in affordable cost.**
- 4. Untidy houses, inappropriate technology adaptation and unhygienic living conditions are few of the common scenario amongst the Bara Mahewa & many basti of Gorakhpur. The house with the sanitation unit ensured the better health and hygiene of the family.**

## Transforming Lives (Social & Design Process):

**Social Process:** the social process was started by identifying the need of the community. The existing housing pattern was studied. The materials used and their costs were analyzed. The uses of their housing were observed. Following are the observations:

- People construct their houses without any technical consultations and so the local masons construct their house in their own way.
- The light and the ventilations are less in their houses which make their house dark even during day.
- Toilet facilities are rarely considered while constructing the house; hence the living community mostly deprives the proper health and hygiene living conditions.
- Low height plinth makes them vulnerable to the recurring floods.

Considering above issues, the house was designed which were discussed with the community before implementation

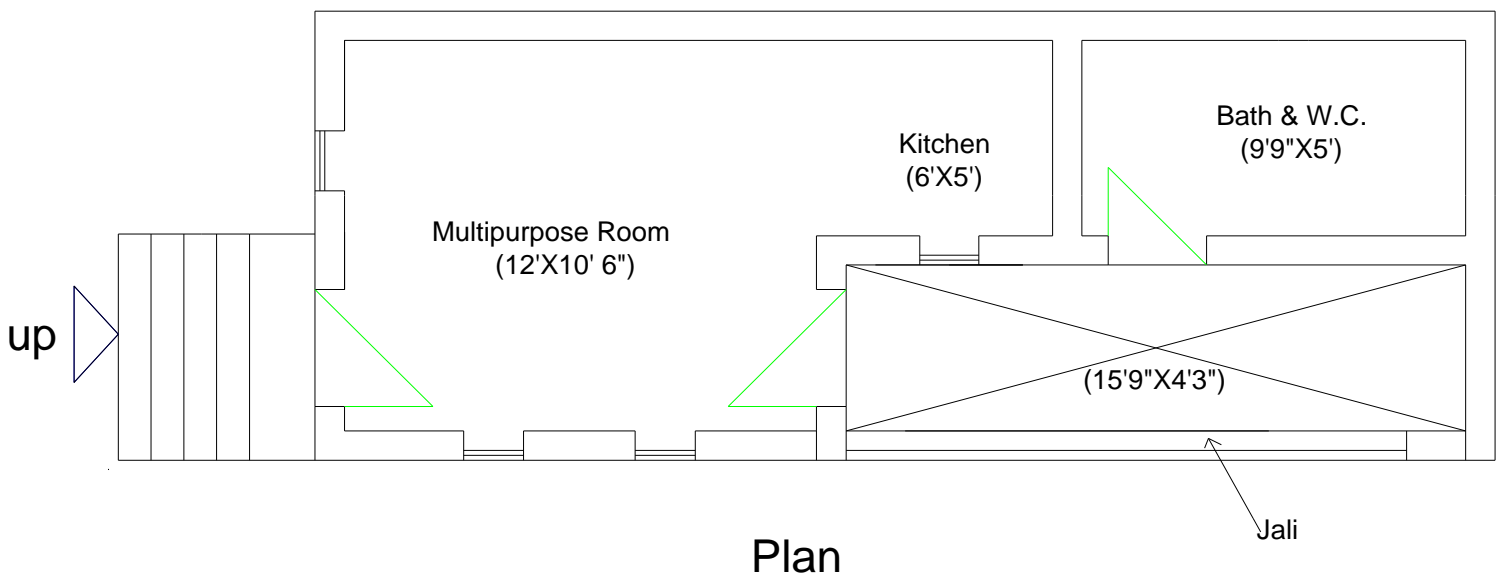
- Community praised the idea of the multipurpose room along with the kitchen.
- Though attached bathroom and toilet were never a part of their own houses, but they welcomed the idea.
- They also realized that their houses are dark even during day. So they like the idea of open corridor that would ensure lights and ventilation.
- Need of a separate space for the women need in the kitchen, integrated the design idea of small kitchen unit separated by curtain in the multi-purpose hall itself.

**Dular**, the most deprived man and his family, of one 14 years old daughter and 17 years old son, had no house apart from their only belongings of a piece of land and his haath-thela and so they had to live in the neighbor's house. He is a daily labor and has no other secondary livelihoods. And due to an accident in 2011, he had severe leg injury and he was not able to work as daily labor. His son works as an assistant in a book store and runs the family by earning Rs 2000 per month. His wife left him ten years ago, so the community feels that adolescent children need a place to stay. He agreed to make it a demonstration house and help the community to understand the different technical innovations related to house constructions which deal the climatic hazards like water logging, earth quake etc.



**Design process:** The design of the house was proposed with a multipurpose room and adjoining kitchen, attached toilet and open corridor. The project proposes a demonstration of a one core room model house for the poor and the weaker section people who face climatic hazards in Mahewa ward. The house would introduce various technologies to overcome these problems and create awareness among community on the risk resilience building at a minimal cost. The objectives of the demonstration of the house are to replicate this model and also converge it with the various housing scheme, so the people from the weaker section can have a safe home.

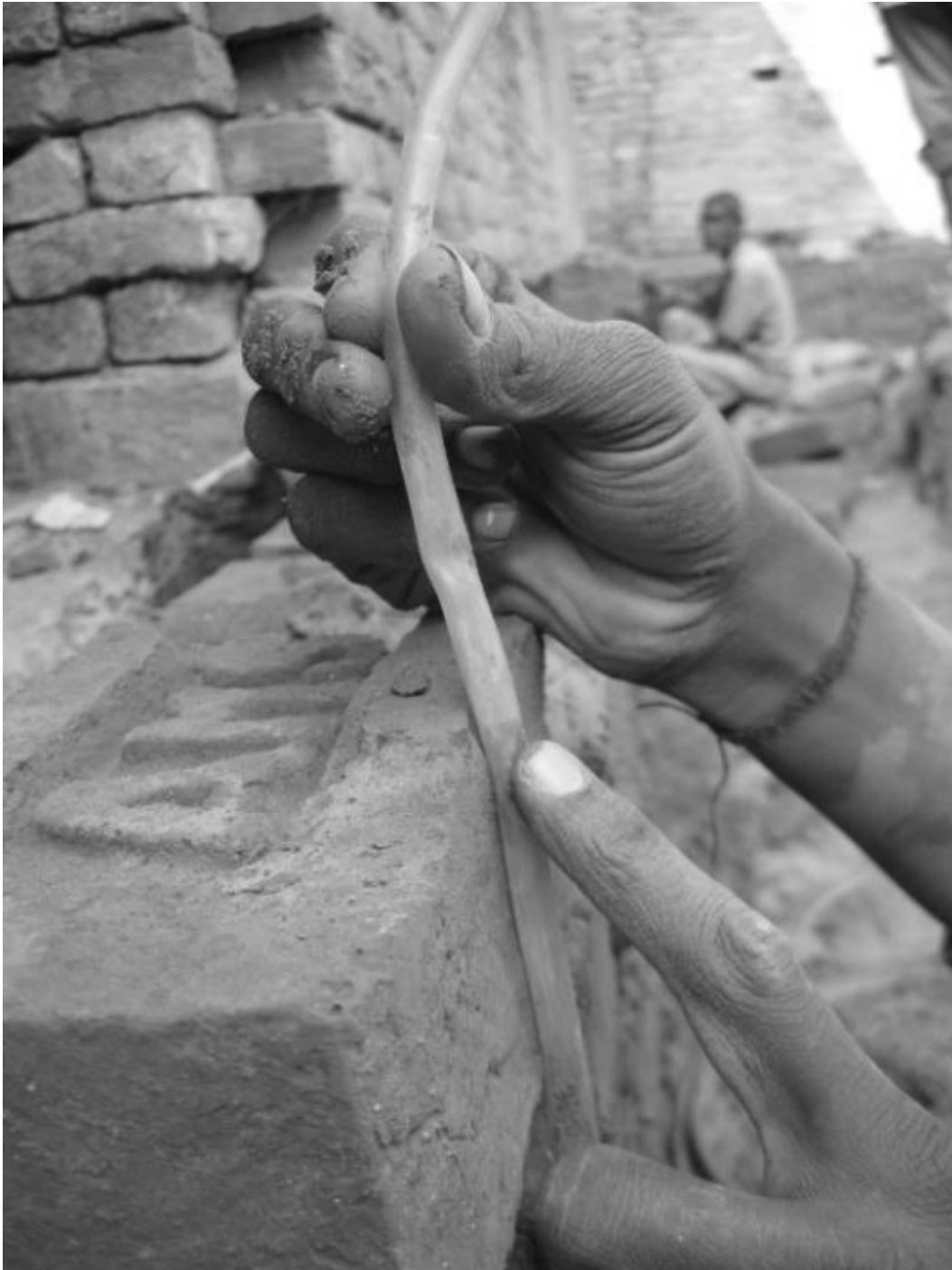
1. The core room with the kitchen has multipurpose usage. With proper ventilation and lights, the house can ensure healthy living.
2. The open corridor exposes the house to proper ventilation and lights.
3. No frames and windows make the house a unique in style and cost saving model.
4. Iron arch also make the doors well-built and carry the load and ensures ventilation in the room.





## Technical Process (How to construct without an architect/engineer)

**‘Hundreds & millions lack affordable housing. They are living in shacks made of cardboard, thermocole, thatch or any scrap pieces they find. Hence, low-cost house is solution in an affordable cost to construct a safe, secure and sustainable house.’**



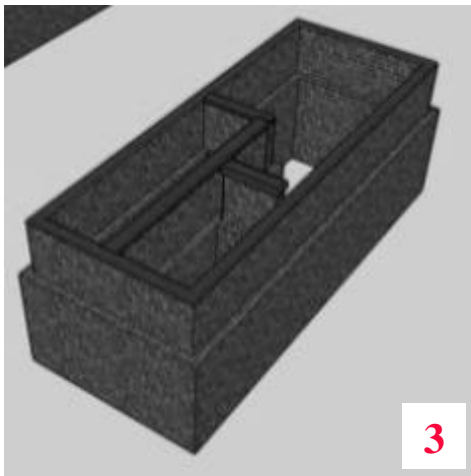


**‘House-A house provides shelter against natural elements such as rain, sunshine and wind. It also provides security and privacy.’**

**A building consists of the following basic parts:**



# 7 Easy Steps to Construct Safe Sustainable & Climatic Comfort Low Cost House



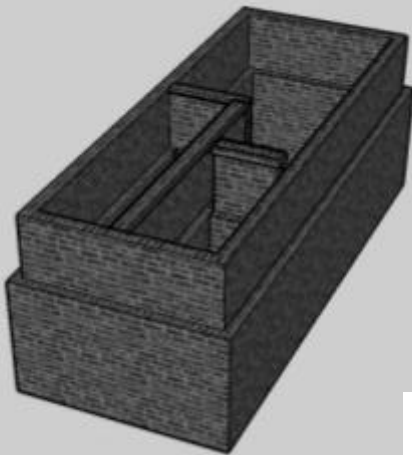
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D.P.C Course to prevent surface water from rising into the walls



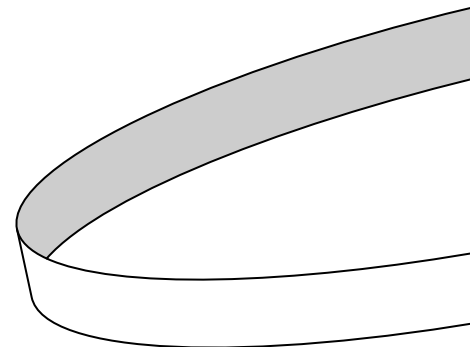
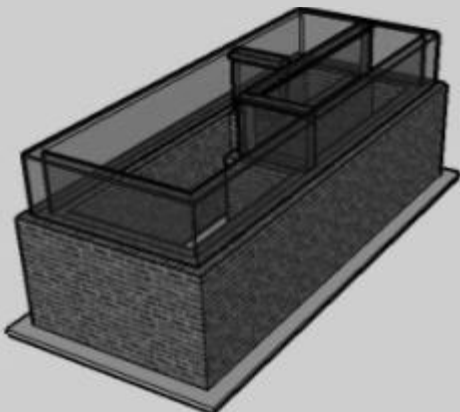
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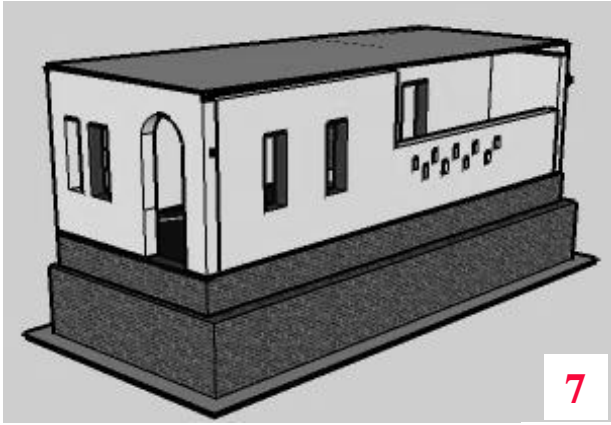
Brick bat Flooring: done to prevent dampness from rising to the top and to have a firm platform that can be kept hygienic and clean.



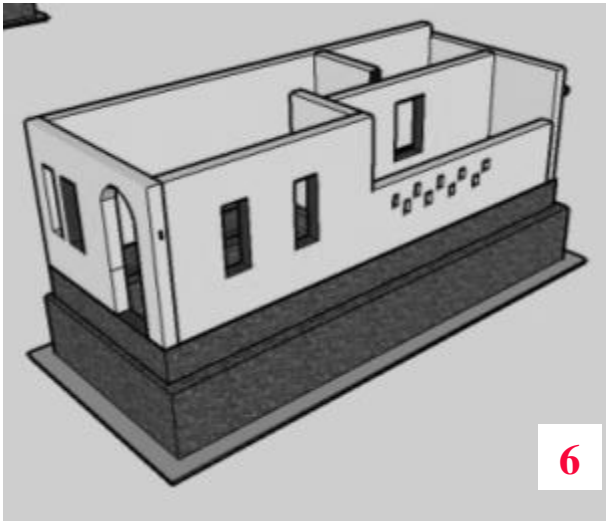
2

Lay Brick Plinth height, to keep the house safe & clean from flood water

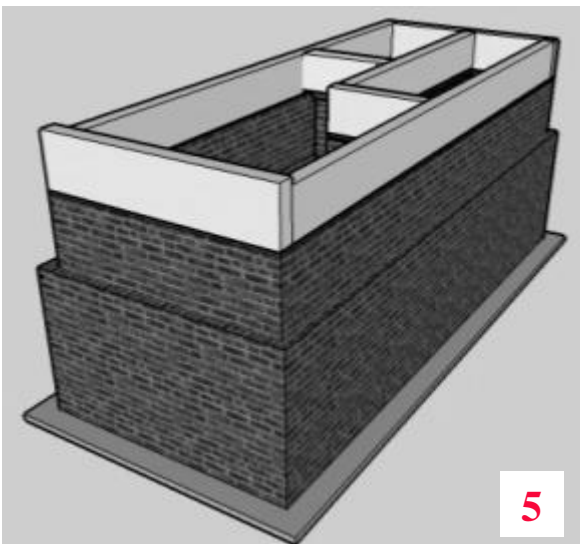




**Roofing roof provides protection for the building and the people living in it.**



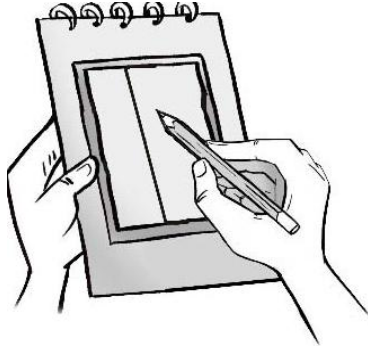
**Arched openings provide stability, an aesthetically pleasing look, besides considerable reduction in cost**



**Rat Trap Walls provide security and protection against natural elements such as wind, rain and sunshine.**

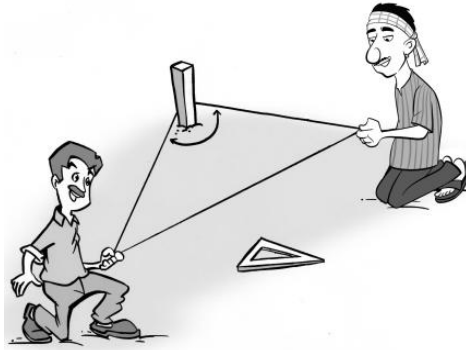
Layout: While laying out the plan on the ground following instructions to be considered:

**Step 1: Lay the corner points on the ground as per the designs of the house.**

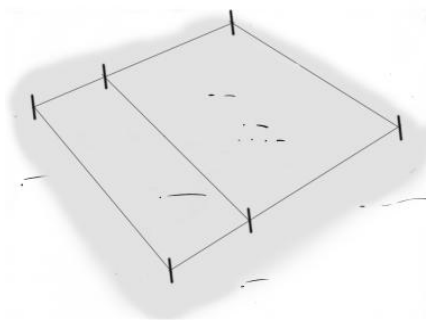


**Step 2: Mark the 4-5 triangle on the walls are laid on 90 degree**

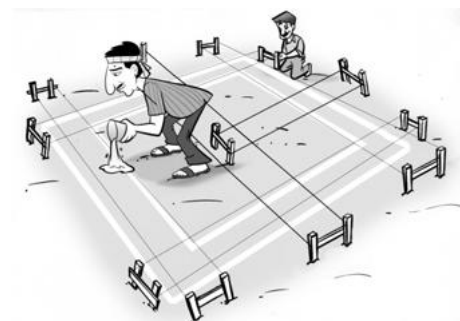
**corners, so that**



**Step 3: With the help of a rope, convert the central lines into the wall width.**



**Step 4: Mark the 2 feet distance from the central lines marked for the layout**



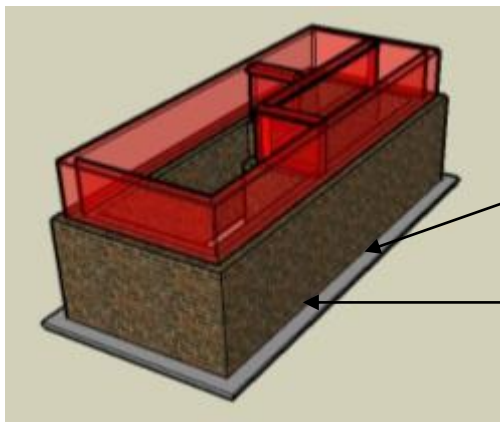
## 1. Foundation:

A foundation is necessary to evenly distribute the entire building load on the soil in such a manner that no damaging settlements take place. Hence, the foundations need to be constructed on good/solid ground.

### 1.1. Excavation & Leveling of Ground:



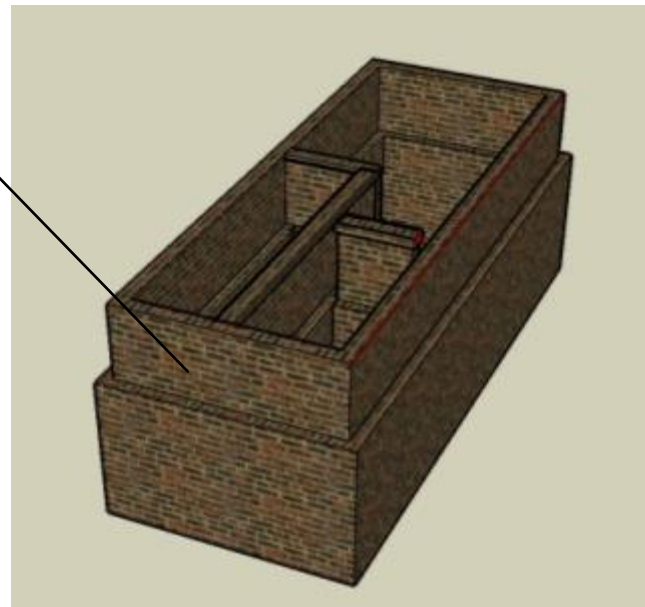
### 1.2. Continuous Spread Brick Footing:





## 2. Plinth:

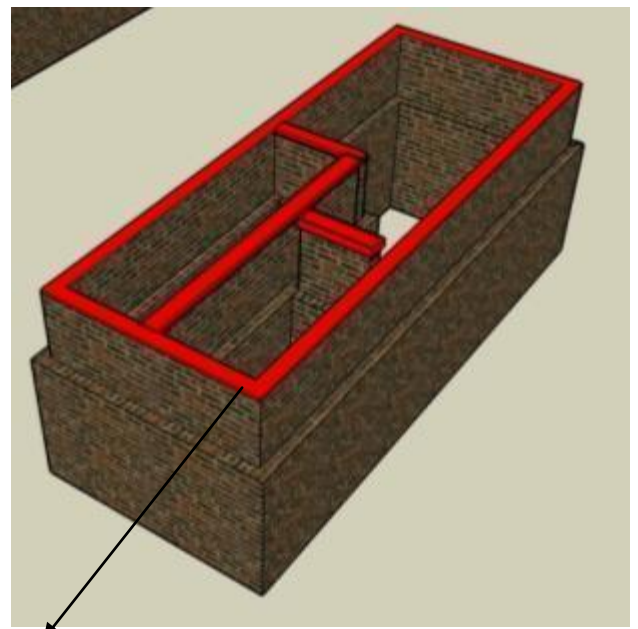
A plinth is normally constructed just above the ground level and immediately after the foundation. It raises the floor above the ground level and herewith prevents surface water /flood water from entering the building.



**Laying Brick Plinth to  
desired Height**

### 3. Damp proof course (DPC)

Damp proof course is a layer of water proofing material such as asphalt or waterproof cement or bitumen. Walls are constructed above the damp proof course. Damp proof course prevents surface water from rising into the walls. Dampness reduces the strength of the walls and creates unhealthy living conditions. Also it affects the paint and plaster and increasing the cost of maintenance Damp proofing layer is not required where a plinth beam is constructed, because the plinth beam already performs like a DPC.

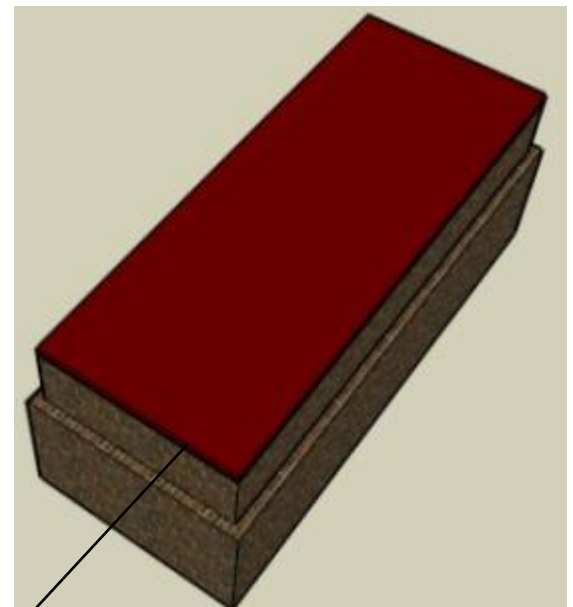


Laying Bitumen DPC Course



#### 4. Floor: Brick Bat Flooring

This is the surface on which we do most of our activities. Flooring is laid over the filling of the plinth and on subsequent floors. Flooring can be done with different materials, but care must be given that the ground below the floor is well compacted. Flooring is done to prevent dampness from rising to the top and to have a firm platform that can be kept hygienic and clean.



**Brick Bat Flooring**

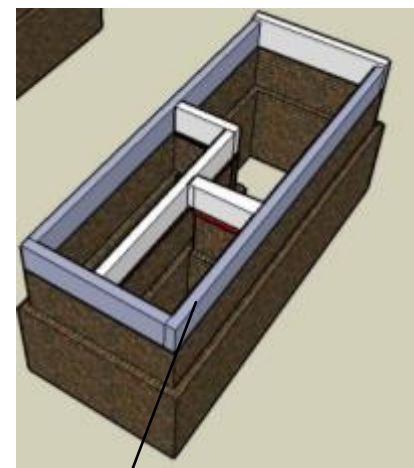
## 5. Wall: Rat Trap Brick Bond

Walls are the vertical elements on which the roof finally rests. They can be made of different materials like bricks, stones, mud, concrete blocks, laterite blocks etc. If the walls are very long, columns can be provided to carry the roof. Walls provide privacy and enclosure. Walls also provide security and protection against natural elements such as wind, rain and sunshine. Openings are to be provided in wall for access and ventilation. Walls were constructed in rat trap brick bond to make the house more climates friendly and ensure comfort living in an extreme weather. It also reduces the cost by reducing the number of bricks used in construction.

Rat-trap walling system using locally available bricks was introduced in India by eminent architect Laurie Baker. This makes use of 17% less bricks and 54% less cement mortar besides reducing the man-days as well, thereby reducing the cost of wall by 26%. The bonding of the walls leads to less number of bricks and less number of joints and hence the savings in cement mortar. Rat-trap bonded brickwork is a method of brick bonding which optimizes the use of building materials. This uses 19% less bricks, 54% less cement mortar and has 25% less dead weight. These walls have very good insulation capacities.



Get the First Course Right

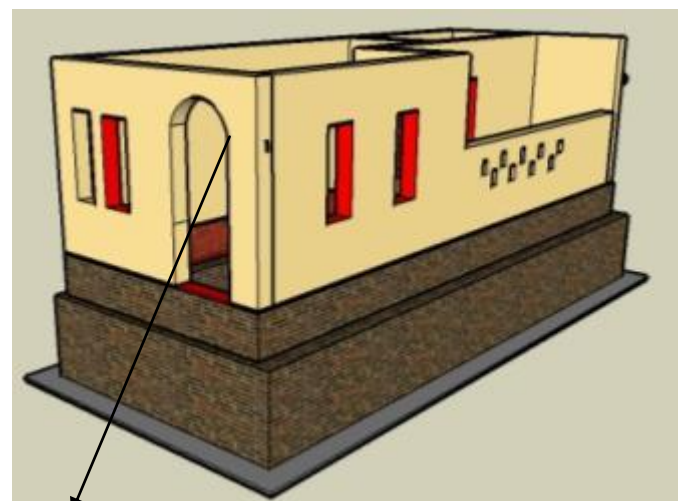


Brick Wall above Plinth

## 6. Openings

Openings are normally provided in the walls as door, windows and ventilators. Doors provide access; windows and ventilators provide light and ventilation lintels are constructed just above the openings. It is normally a stone slab or a concrete slab. Sill is the part of the wall that is just below the window. Lintels are constructed to hold up the walls above the openings. In earthquake prone areas a continuous lintel beam is provided all over the walls.

Significance: Openings are spanned by brick arches which provide stability, an aesthetically pleasing look, besides considerable reduction in cost from the reinforced cement concrete lintels. Openings as large as 15 feet can be spanned by brick arches. In this form of structure, the bricks are held in place due to increased shear force acting between them.

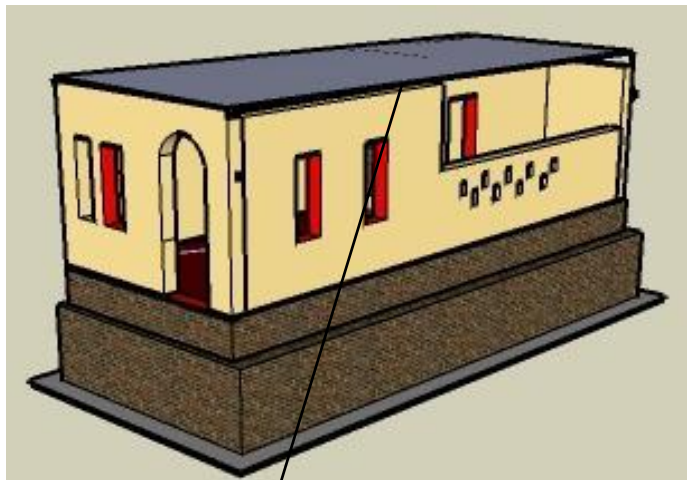
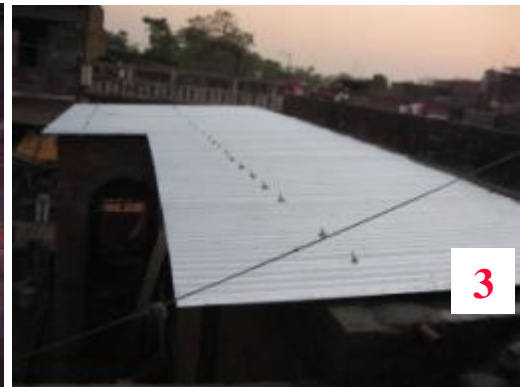


**Brick Arched Openings**



## 7. Roof

The roof provides protection for the building and the people living in it. The roof rests on the walls and requires proper anchoring so that wind and other impact cannot destroy it.



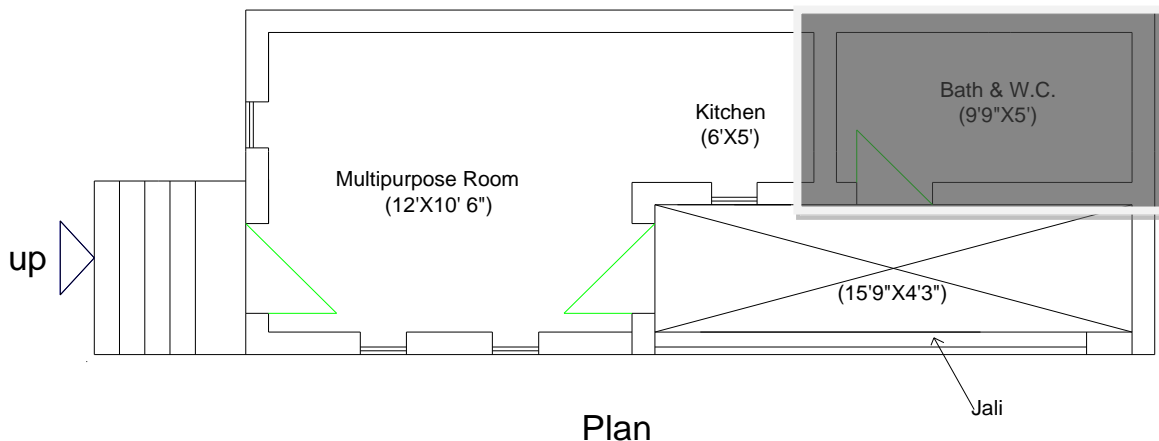
**CGI Roofing Sheets**

## 8. Surfaces / Finishes: Patch Pointing on Walls

External finishes are the outer most layer of protection, which protect the structure from weathering & give durability. Pointing avoids weathering and decay that can be caused in the joints between masonry units (usually bricks), allowing the undesirable entrance of water.



5. **Toilet:** Untidy houses, inappropriate technology adaptation and unhygienic living conditions are few of the common scenario amongst the Bara Mahewa & many basti of Gorakhpur. The house with the sanitation unit ensured the better health and hygiene of the family.



## Why Cost-Effective Technology Comparison

<b>Technologies</b>	<b>Traditional</b>	<b>Conventional</b>	<b>Low Cost technologies</b>	<b>Cost Benefit/Material Saving</b>
Foundation	Mud foundation	RC column & footing	Brick Spread Continuous Footing	Cost effective if compared to conventional practices
Plinth	No plinth	RC Plinth	Brick Plinth	
DPC	No DPC	No DPC	Bitumen DPC	
Wall	Mud walls	Brick Wall	Rat-Trap Bond	25% less bricks as compared to conventional brickworks saves costing of 25% as compared to traditional and conventional practices
Openings	Small openings creating less ventilated unhealthy spaces	Framed Doors Openings	Arched Openings	Structurally sound cost-effective option
Roof	Tin or Thatch	RC Slab	CGI Roofing	Saves cost and high energy consuming materials like steel and cement
Doors & Windows	Framed Doors & Windows	Framed Doors & Windows	Frameless doors and windows	Cost saving on frameless doors and lightweight doors and window panels