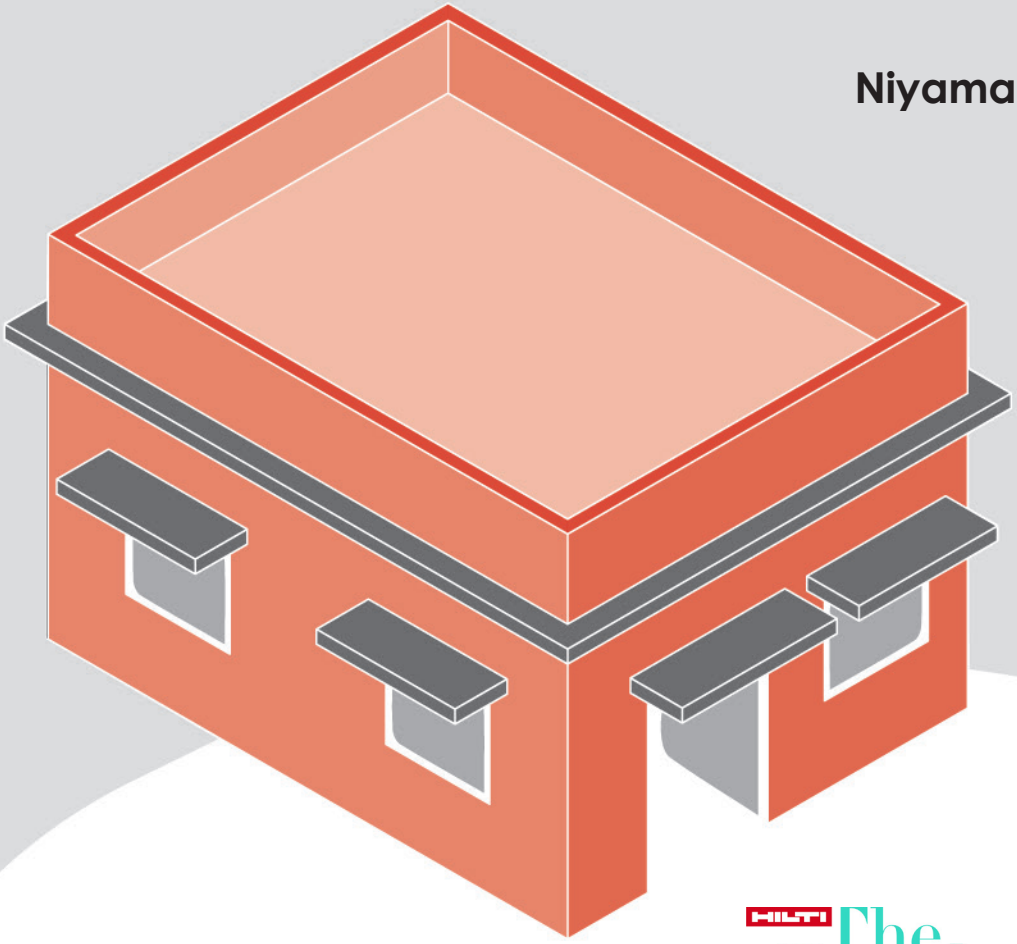
# GRUHA NIRMANA KAIPIDI

Niyama Namma Katadakage



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Jana Urban Space

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# 1. INTRODUCTION

## 1.1 Why Should You Use this Manual

This Design Compendium is meant to guide you in the planning and building of your homes. It will go through the entire process of building a home, from beginning the design to understanding structure and materials that have to be used.

The key aspects of the manual are:

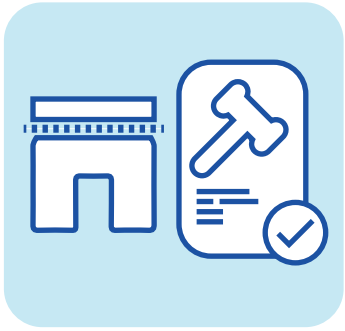
**Introduction to housing schemes**
This chapter provides details on housing schemes offered, how they function and how they can be availed for your home.

**Design**
This chapter will guide you in planning your home with respect to the plot dimensions, location, and building bye-laws. It will help you to arrange spaces according to your family size, keeping in mind *vaastu* principles.

**Building construction**
This chapter of the manual will help you understand the construction methods and materials for each individual component of the building. This section will also describe the services that need to be incorporated such as electrical and plumbing.

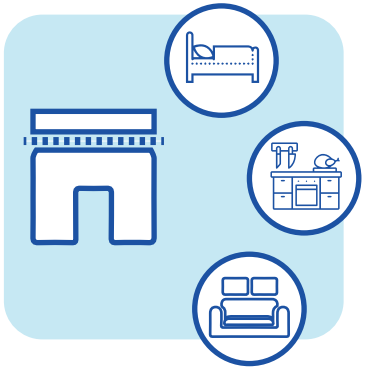
## Are you planning to build a house in the next few years?

## 1.2 How to Use this manual



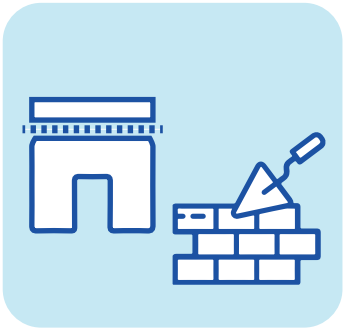
### 1 Intend to build a house for your family

- Find housing schemes and understand the procedure to apply for them.
- Identify land for the house - through own land or government-aided acquired land
- Find Small Finance banks providing housing loans
- Get the necessary approvals to build the house



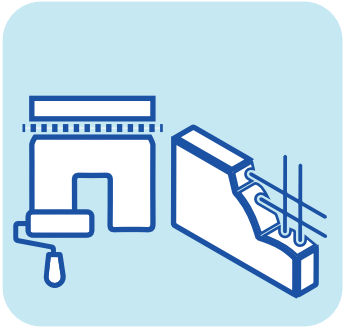
### 2 Plan and design your home

- Understand your requirements for the home depending on the number of family members
- Know your plot size
- Know standard room sizes for living, kitchen, bedrooms and toilets
- Place the rooms on the plot as per *vaastu*
- Plan for future incremental expansion when designing



## 3 Type of structure, materials, services & finishes

- Understand the best structure for your needs
- Know the different parts of a house and the order in which they are constructed
- Learn about different materials that can be used for different parts of the house
- Plan services such as electrical and plumbing within your home
- Learn about the options available in finishes such as flooring, painting, etc.



## 4 Construction of your home

- Be well informed before you approach your *mestri* for construction of your home
- Be involved throughout the process of construction of your home

## 1.3 What are housing schemes and how to avail them

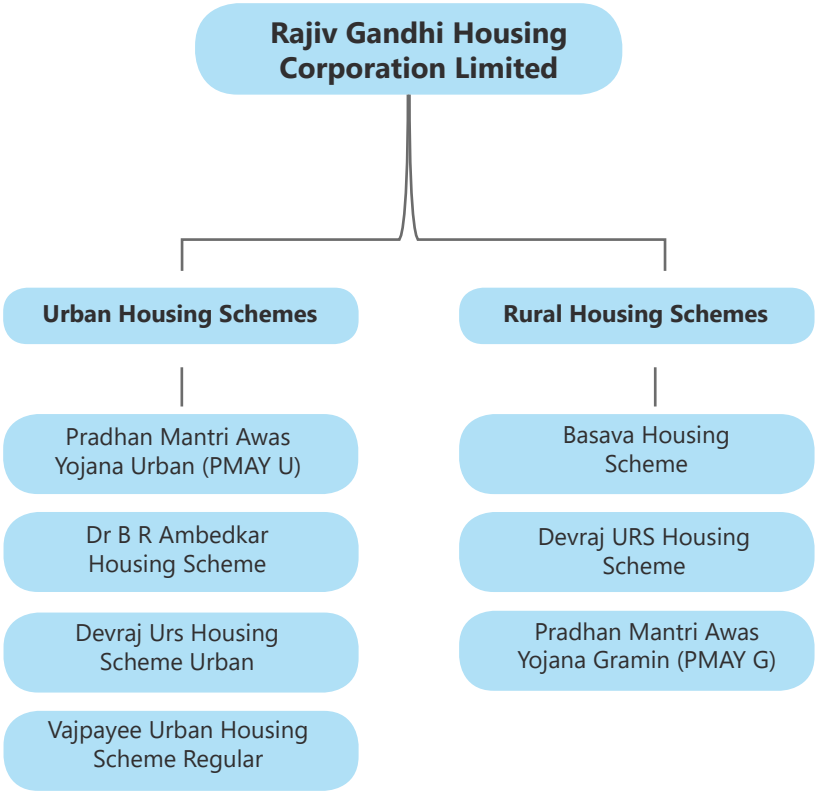
The Government of India plays an important role in the building construction industry and has set up housing schemes for low income groups. This section of the compendium broadly outlines the schemes offered by Government of Karnataka within Panchayat and Municipal limits.

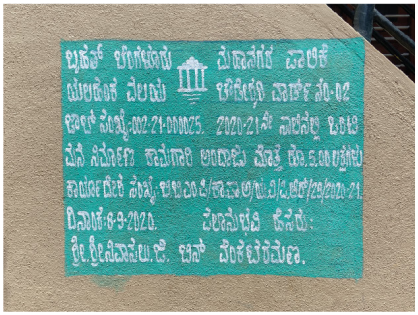
### What is a housing scheme?

Government assists individuals looking to build homes in providing partial funding for the construction of their permanent houses with basic amenities.

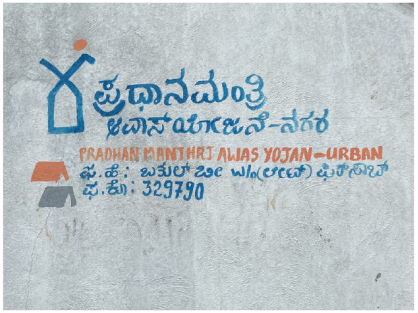
The Government of Karnataka has initiated the **Rajiv Gandhi Housing Corporation Limited,** to provide housing and ensure effective implementation of central and state housing schemes to economically weaker sections of society throughout the state.

*RGHCL - Rajiv Gandhi Housing Corporation Ltd.*


Rajiv Gandhi Housing Corporation Limited
Urban Housing Schemes
Pradhan Mantri Awas Yojana Urban (PMAY U)
Dr B R Ambedkar Housing Scheme
Devraj Urs Housing Scheme Urban
Vajpayee Urban Housing Scheme Regular
Rural Housing Schemes
Basava Housing Scheme
Devraj URS Housing Scheme
Pradhan Mantri Awas Yojana Gramin (PMAY G)



*BBMP – Onti Mane Scheme at Chowdeshwari layout*




*Pradhan Mantra Awas Yojana – PMAY at Kandavara*


*Vajpayee Nagara Vasati Yogana at Kandavara*

*Examples of housing Schemes and housing units built under that scheme*

## Where to look for available housing schemes?

1 

**Municipal offices**

Anyone looking to avail information on housing schemes can approach the municipal office in their regional limits with the housing caseworker or the Assistant Engineer.

2 

**Newspapers**

The announcements for different housing schemes will be advertised on local newspapers by the concerned departments.

3 


**Online portal**

Visit online web portals for details related to housing schemes.
https://ashraya.karnataka.gov.in/
https://site.bbmp.gov.in/schemes.html/

4 

**Announcements**

Door-to-door announcements about available housing schemes are another way that housing caseworkers or other relevant authorities raise awareness about housing schemes and funding programmes.

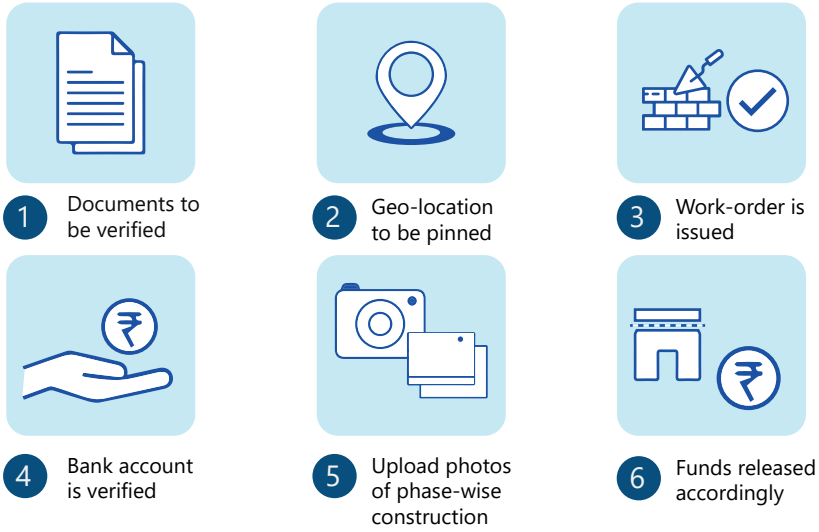
## Who is Eligible for Housing Schemes?

- The eligibility criteria is different for every housing scheme, based on urban or rural areas.
- The applicant's income could vary from Rs. 32,000 to Rs. 6,00,000 anually depending on the scheme.
- The applicant can own their land however the applicant or other members of the family should not own a house in any part of the state.

## What documents have to be submitted for these housing schemes?

1. Identity Proof (Aadhar card/ Voter ID card/ PAN card)
2. Income certificate/ Caste certificate
3. Bank details
4. Land documents

## Process in documentation and construction of house under government-aided housing schemes



## Small Finance Banks

Small Finance Banks (SFBs) are a specialised segment of the Reserve Bank of India that provide banking services to underprivileged people. They enable financial inclusion by providing access to basic banking services.

## Types of SFBs that offer housing loans

National Housing Bank and Karnataka Gramin Bank are part of government small finance banks.

**National Housing Bank**

- It focuses on housing for low and moderate income individuals.
- It offers two housing loan schemes under the 'Housing for All by 2022' programme of the government namely, **Pradhan Mantri Awas Yojana (PMAY)** and **Rural Housing Interest Subsidy Scheme**.

**Karnataka Gramin Bank**

- The bank provides home loan programmes that are available at competitive interest rates.
- A house can be purchased or built or a site can be purchased and a house built on it, or a house can be renovated or expanded with the help of a loan.

There are also privately owned small finance banks that can be approached to avail loans. Some options are as follows:

- Jana Small Finance Bank
- Ujjivan Bank
- Fincare Bank
- AU Bank

## 1.4 Do you need permissions to build your house?

This section broadly covers how to go about regulatory approvals that need to be obtained for house construction.

### What are regulatory approvals?

Regulatory approvals are the necessary approvals/licenses or registrations required from concerned departments before the start of construction, at the time of construction and post construction as per the local authority norms.

### Why do you need to follow regulatory approvals?

The development authority in the relevant jurisdictions has control over the types of areas developed and buildings built in line with the specified norms for the safety and well-being of the families.

Having a legal approval from the concerned authority clarifies that your house has met all necessary specifications. Without the appropriate approvals, buildings may be subject to severe penalties, and in some situations, they may be demolished without warning.

### How can you obtain regulatory approvals?

To obtain the approval, it is necessary to know the regional limit that your plot belongs to.

## In Panchayat limits

The construction of the house in the village needs a formal approval from the panchayat office (**E-Swathu**). The building approval is required for a project budgeted for more than Rs. 10,00,000.

E-Swathu is a Government of Karnataka scheme that helps clarify ownership details of properties in rural areas.

## In Town and City limits

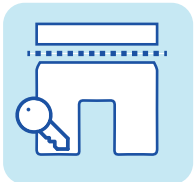
The construction of the house require following approvals from the government departments.

1 Obtain land clearance approval

2 Obtain plan approval

3 Apply with the approved plan to BWSSB and BESCOM

4 Obtain Column Completion (CC) certificate during construction



5 Receive Occupancy Certificate at the end of construction

** BWSSB : Bangalore Water Supply and Sewerage Board*
**BESCOM: Bangalore Electricity Supply Company Limited*

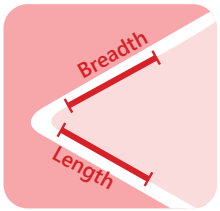
# 2. DESIGN

## 2.1 How do you begin planning your home?

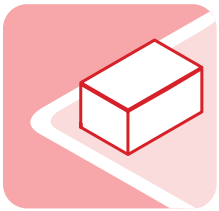
Before building a home, a plan has to be finalised based on the plot owned. This section will help you to start planning your home.

The first step is to identify the location of your plot. This will determine how you enter the plot and where to place the entrance to your house. The second step is to know the plot dimensions, this will help you understand how much you can build within the plot area. The third step will be to plan the house according to your family size.

1 Identify Plot Location




2 Obtain Plot Dimensions



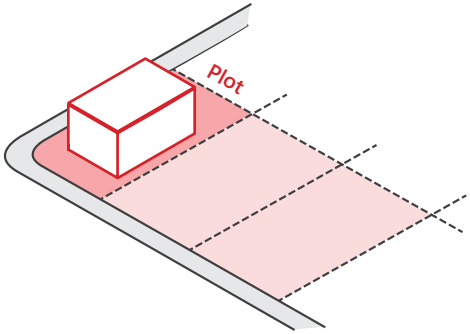
3 Decide the size and type of housing unit

## 2.2 Start with the plot

### Choose your plot location

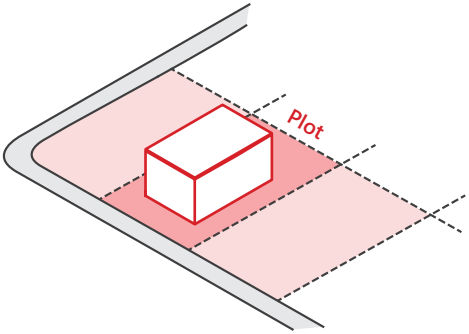
The first information you need to start planning your home is the location of your plot on the street. There are two possible plot locations:

1. The Corner Plot - located at the junction of 2 (or more) roads. Two adjoining sides of the plot boundary are towards the road.




Location : Corner Plot

2. Between Two Plots - located in between two plots/buildings and having access to the road on one side only.

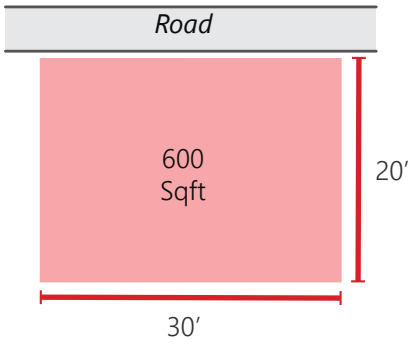


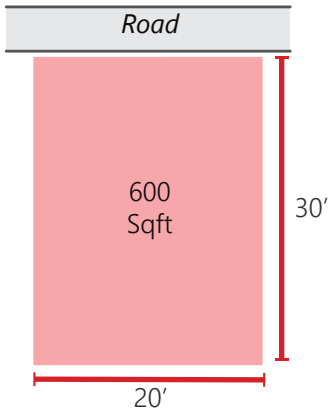

Location : Between 2 plots

## Choose the Plot Dimension

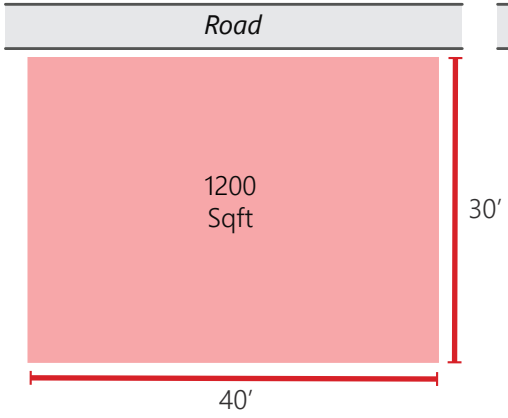
The second step is the plot dimension, which is the length and breadth of the plot. The site boundary facing the road would be the entrance to the plot for designing the house. Your plot size may vary by a few feet from what is indicated here.

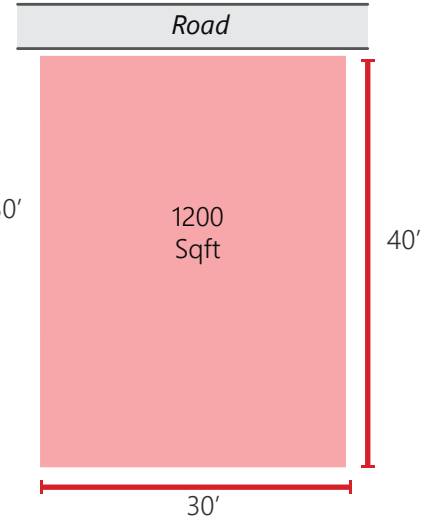
### Type 1 - 20' x 30' site




### Type 2 - 40' x 30' site

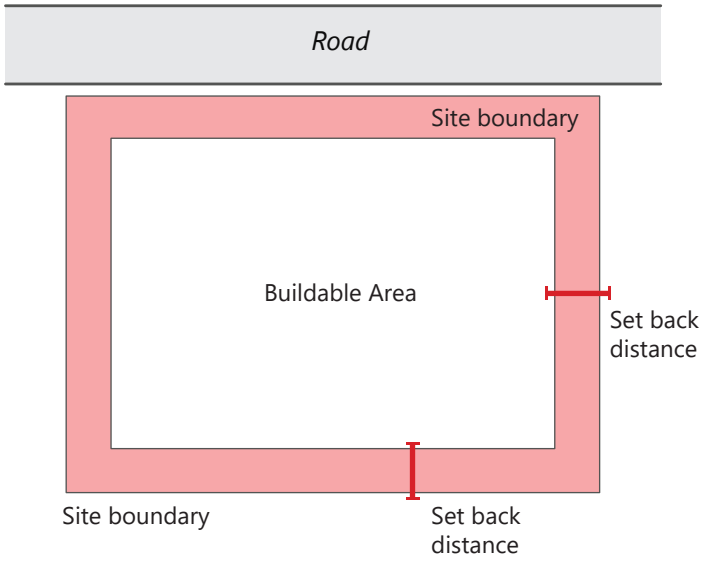



Typically, plots are of standard sizes as shown here. The orientation may vary, and care has to be taken to plan the house according to the orientation.

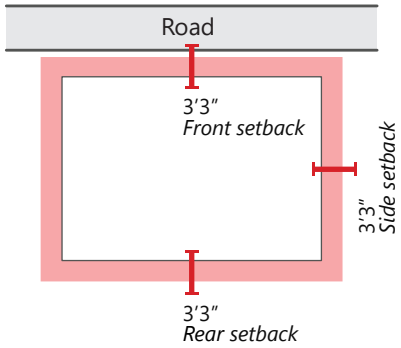
## 2.3 Do setbacks need to be left?

A setback is the minimum distance to be left from the plot boundary before you can start building your home. Setback area is open space required all around the house. These are as per local regulatory norms and are meant to protect your house against structural failure and fire hazards.

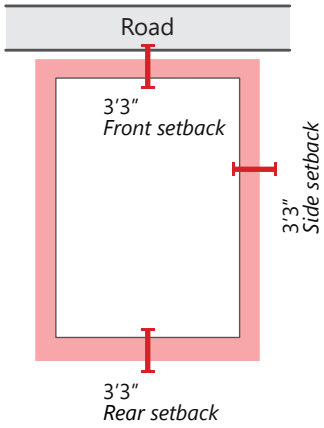


## Type 1 - 20’ x 30’

Type 1 - A
Front & Rear Setbacks : 3’3”
Left & Right Side Setbacks : 3’3”



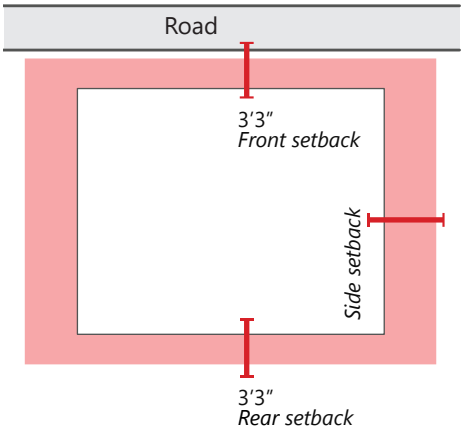

Type 1 - B
Front & Rear Setbacks : 3’3”
Left & Right Side Setbacks : 3’3”



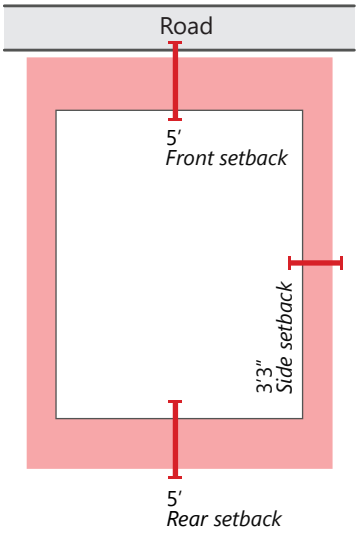

The 30’x20’plot will have 3’3” setback on all sides, regardless of orientation of plot

## Type 2 - 30' x 40'

Type 2 - A
For site depth over 30'
Front & Rear Setbacks : 3'3"
Left & Right Side Setbacks : 5'



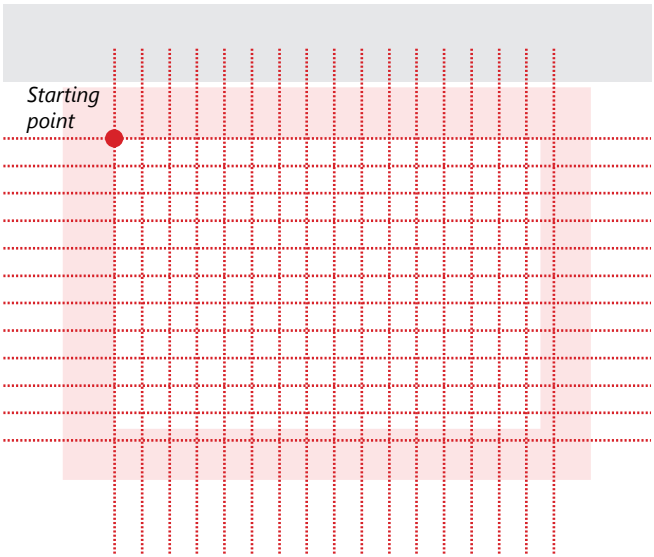

Type 2 - B
For site depth over 40'
Front & Rear Setbacks : 5'
Left & Right Side Setbacks : 3'3"




The 30'x40'plots have different setbacks for each orientation. Please take note of the orientation of your plot when marking setbacks.

## How to use grids to design your house?

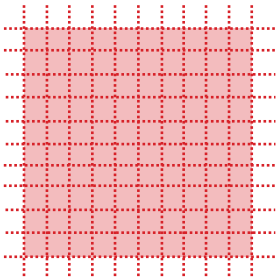
To start designing on your plot, consider dividing the plot into grids of 1ft x1ft. Start from one corner of the site after leaving the required setbacks as shown on below. These grids will help you organise spaces on your plot.



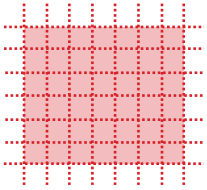
## Is there a minimum area required for the rooms?

There are regulatory standards for the minimum areas specified by the local authority for habitable rooms such as hall, kitchen and bedrooms and non-habitable rooms such as toilets, storage, etc. as shown below.

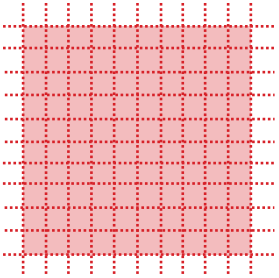
Living room
10'x10'
100sqft



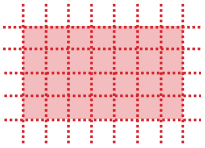
Kitchen
7' x 6'
42 sqft



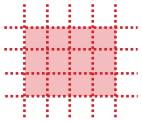
Bedroom 1
10' x 10'
100 sqft



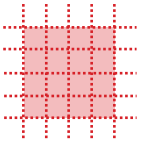
Toilet & bath
6' x 4', 24 sqft



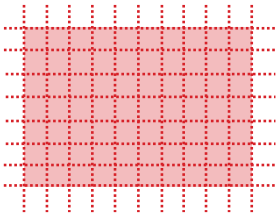
Toilet, 4' x 3'
12 sqft



Bath, 4' x 4'
16 sqft



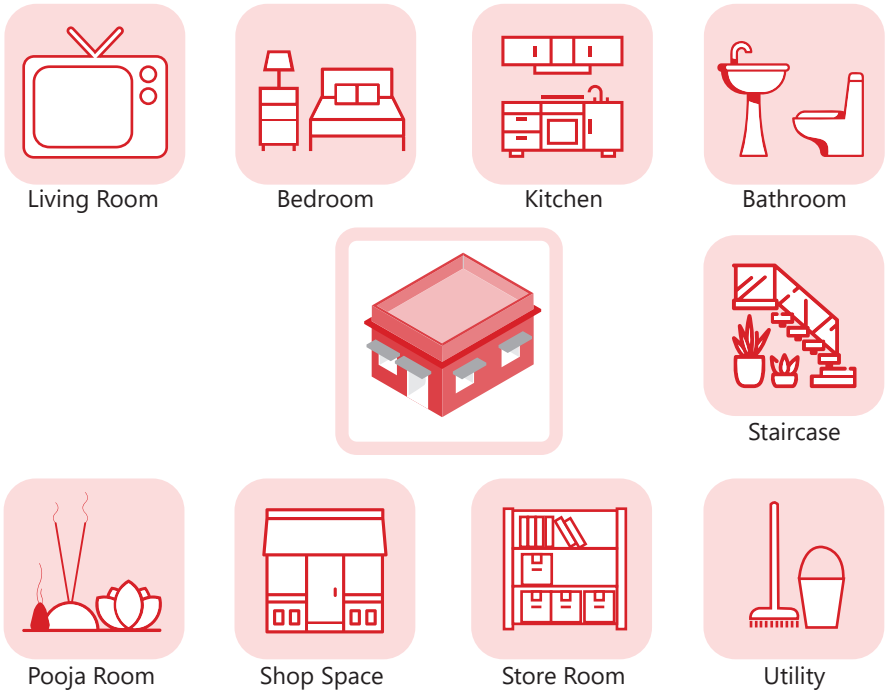
Bedroom 2
10' x 7'
70 sqft



## 2.4 How to plan the rooms in your house?

### Decide which rooms you and your family need

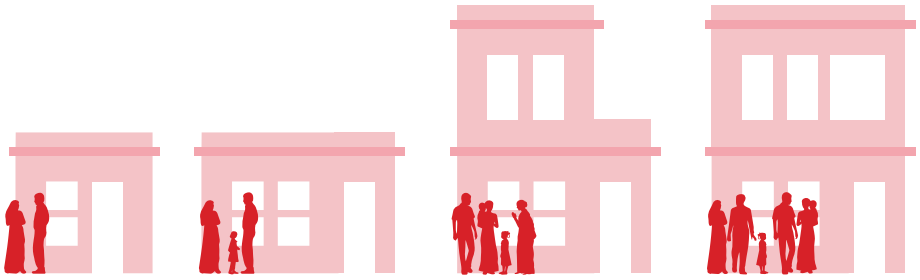
The primary rooms required in a house are the living room or hall, one or more bedrooms, kitchen and toilet. The secondary rooms would be as per your specific needs and may include a pooja room, a storage space or a room for commercial activities. You may also want to build the staircase or plan for it to be built in the future.



## How to decide on the type of housing unit?

Depending on the number of rooms your family needs, you can determine the type of house you need to build. You should customise these as per your plot size, family size, requirements and the budget you have available to build your house.

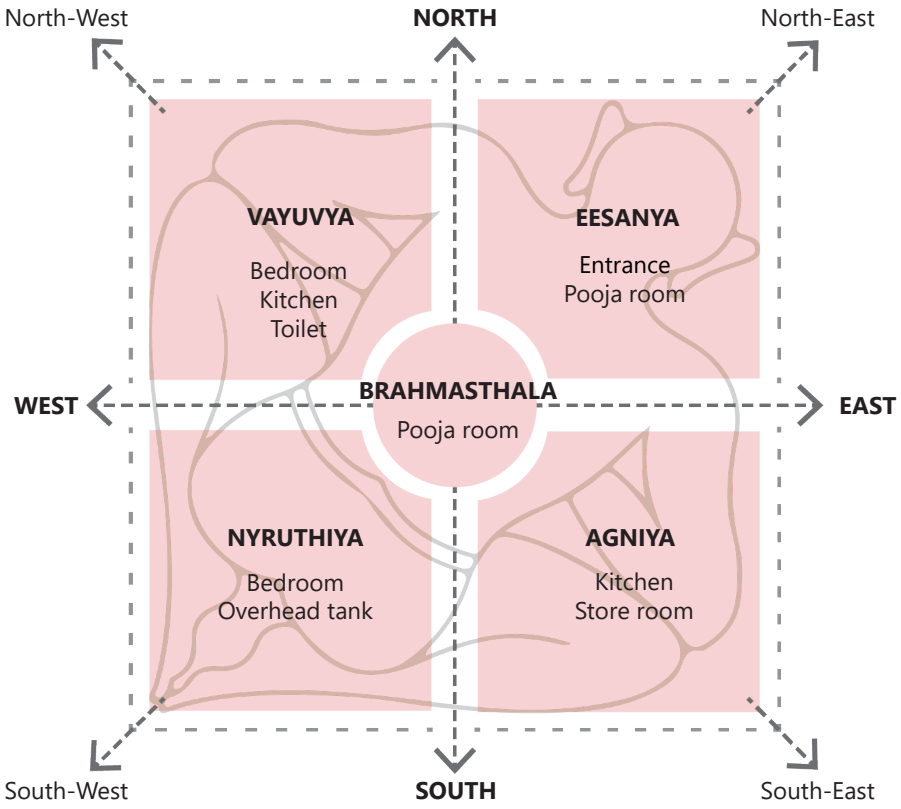
| | | |
|---|---|---|
| **1 RK** | 1 Room & Kitchen | **250-350 sqft.** |
| **1 BHK** | 1 Bedroom, Hall & Kitchen | **350-450 sqft.** |
| **1.5 BHK** | 1 Bedroom, 1/2 Bedroom, Hall & Kitchen | **450-550 sqft.** |
| **2 BHK** | 2 Bedrooms, Hall & Kitchen | **550-650 sqft.** |



1 RHK 1 BHK 1.5 BHK 2 BHK

## How to zone the rooms in your house as per vaastu?

*Vaastu* ensures the households living are indirectly exposed to sunrays inside the house based on their daily activities and position of the sun movement. The decision to design your home according to *vaastu* is entirely up to you and your family. You could also discuss this with a local *vaastu* expert.



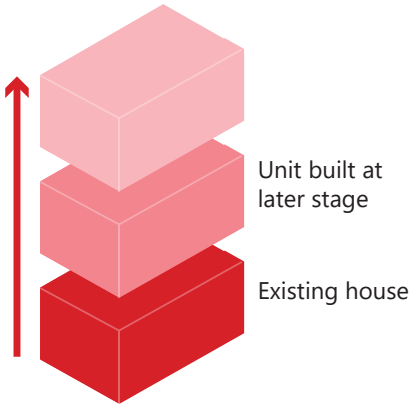
# 2.5 Planning for Incremental Expansion

### What is Incremental Expansion?

Incremental expansion is the process of building a house in stages. This would depend on availability of funds, increase in family members or any other reason. Planning for incremental expansion has to be done from the start, as you will need to plan the space on your plot and design the foundations to take the load of the additional floors. You may also want to add a staircase or leave provisions to add a staircase at a later stage.

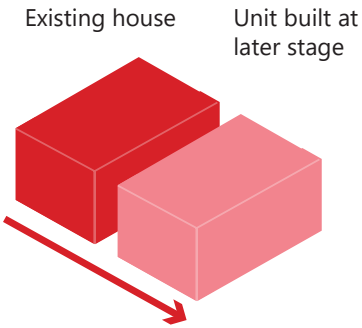
### Vertical Expansion

It is the phase-wise construction of a dwelling unit above an existing dwelling unit.




### Horizontal Expansion

It is the phase-wise construction of a dwelling unit adjacent to an existing dwelling unit.

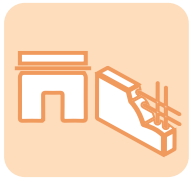


# 3. BUILDING CONSTRUCTION

## 3.1 How to plan the construction of your house?

After you have prepared the basic design and have the floor plans ready, there are some important aspects to be decided and finalised. These include the type of structure, building materials, electrical services, plumbing services and the finishes. This chapter will go over each of these aspects in detail.

The construction technology, building materials and finishes that you choose for your house may be influenced by your budget, interests and local availability of materials.


Type of structure

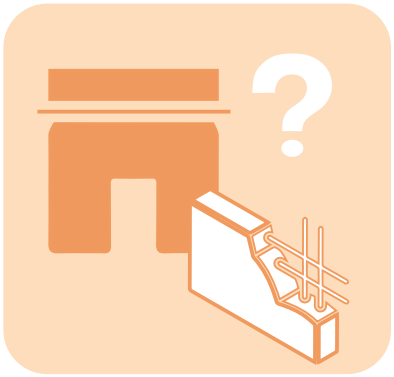

Construction materials


Building Services


Building finishes

## 3.2 Deciding on a Type of Structure

### What type of structure should you build?



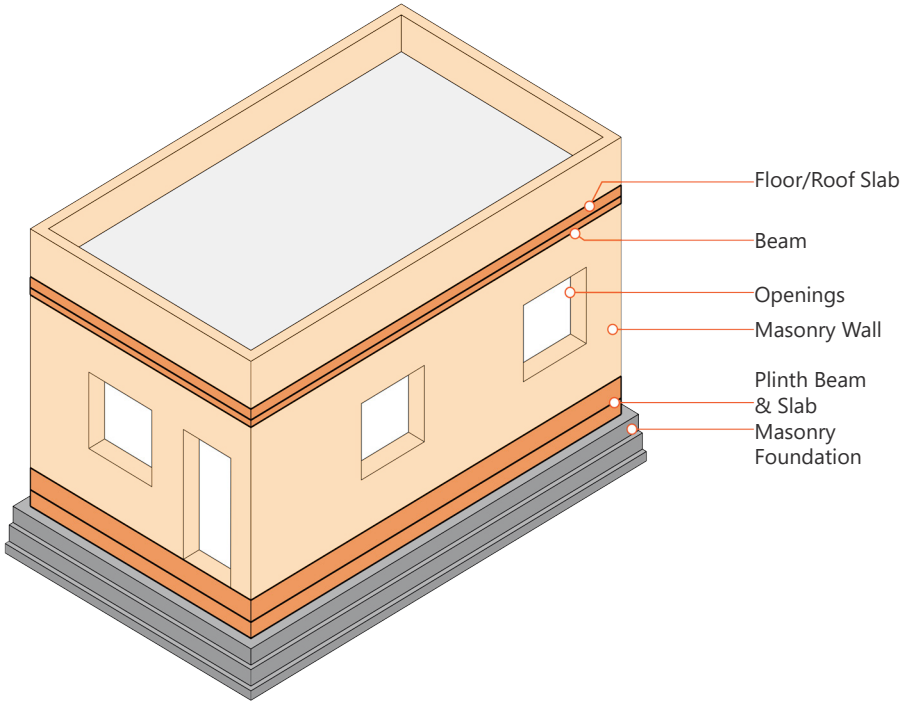
You need to decide the type of structure you will build for your home. The main intent when deciding this is to provide a suitable structure that can resist exterior forces without any difficulties. The method of construction depends on the individual components of the house such as foundations, floors, walls, beams, roofs and the materials used for each.

Before you learn more about the components and materials for the house, you need to understand the two types of structures commonly used for the design of individual housing units. These are -

1. Load Bearing Structure
2. Column Beam Structure

## Load Bearing Structure

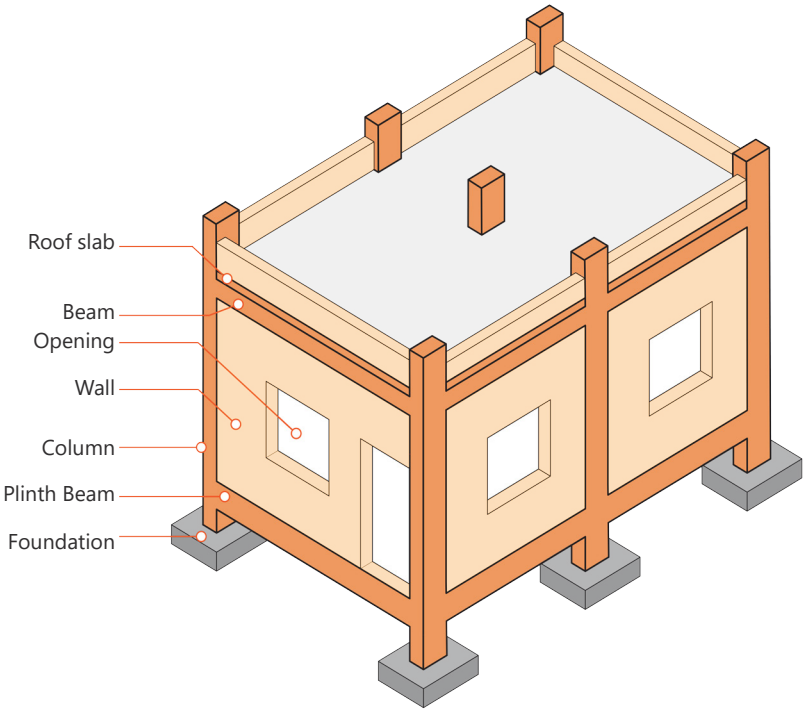
This is a type of structure where the entire structural load is transferred to the masonry foundation through the masonry walls. Floor and roof slabs may rest directly on the load-bearing walls or, in the case of a composite structure, may rest on RCC beams that then rest on the load-bearing walls. Load-bearing structures are relatively cheaper as the masonry, which could be bricks or stones, can be locally sourced. The time taken to erect a load-bearing structure is also relatively shorter.



## Column - Beam Structure

Also called a "framed structure", it consists of RCC columns that are tied together by RCC beams at different levels. Floor and roof slabs are connected to the beams. The load on the slab is transferred to the beams and is further transferred to the columns and their foundation.

Framed structures are relatively more expensive because of the cost of the individual components of RCC and the transportation of the materials. The time to erect an RCC structure is also longer because of the time required for the curing process.

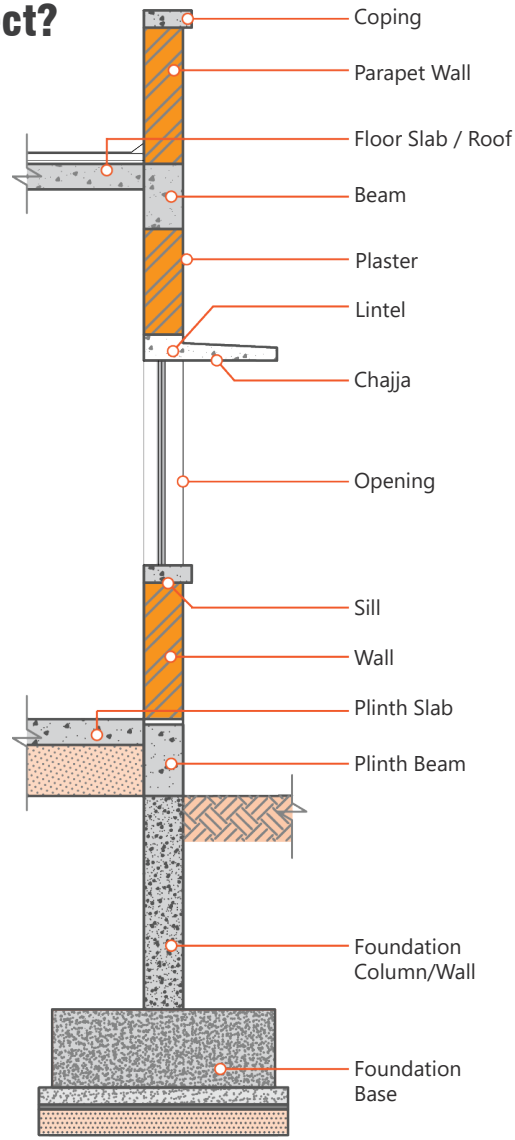


## 3.3 What materials should you select?

Once the type of structure is decided, the materials for the construction of the house must be selected. For this, you need to understand the different parts of the building.

This chapter will go through each building component and the materials that they are made up of. These would differ depending on the type of structure you have selected for your house.

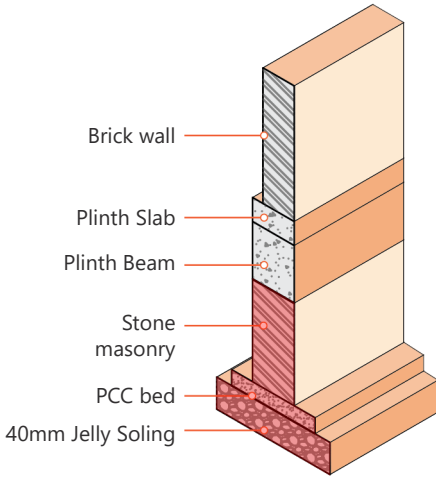
1. Foundation
2. Plinth
3. Column
4. Beam
5. Staircase
6. Wall
7. Sill, Lintel and Chajja
8. Floor Slab
9. Roof
10. Plaster



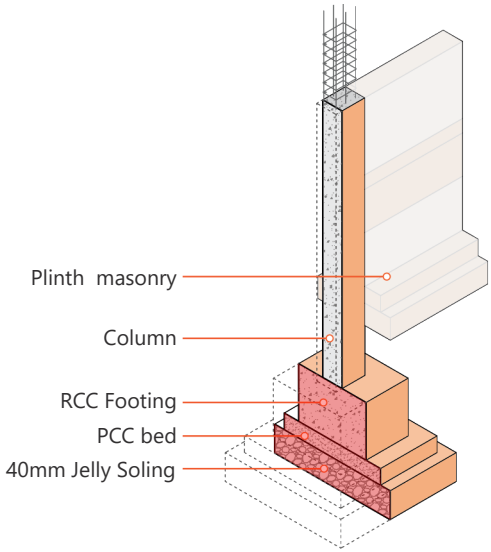
## 1. FOUNDATION

The foundation is the structural element of the building below the ground that supports the main structure. The foundation transfers the load from the structure to the ground and also resists seismic loads. A shallow foundation is usually used in low-rise residential houses.

**Load Bearing Structures**
Strip Stone Masonry laid on the ground along the lines where walls are to be constructed.




**Column Beam Structures**
Isolated concrete footing is used to support the individual columns.



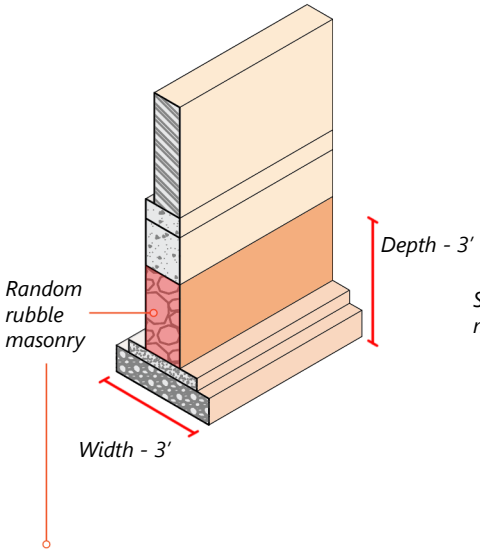

** Reinforcement detail is indicative*

## Foundation in Load Bearing Structures

The foundation is made with locally available natural stones and cement mortar. The stones are either random rubble masonry or size stone masonry depending on what is easily available. Natural rocks that have been cut and chiselled to the required sizes are most commonly used for masonry foundation construction.

### Random rubble masonry

**Material** - Natural rock rubble masonry and cement mortar

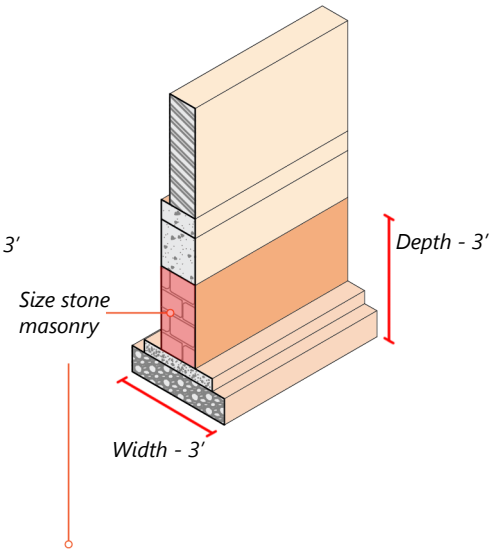




Random rubble masonry

### Size stone masonry

Material - Size stone and cement mortar





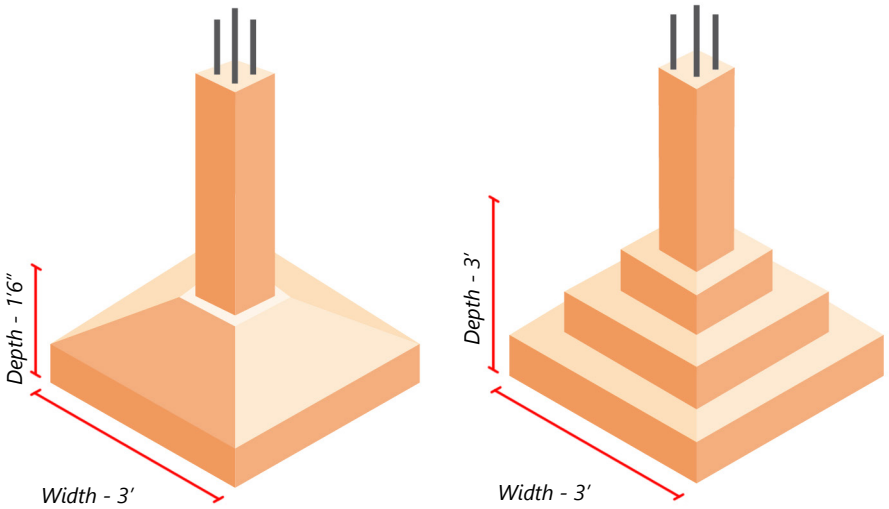
Size stone masonry

## Foundation in Column and Beam Structures

The foundation for framed structures is a shallow RCC foundation below ground. The footing can be a simple square, rectangular, stepped, or sloped footing. It can be an isolated footing for single columns or a combined footing for two adjacently placed columns.

Initially, the soil is excavated to the depth of the foundation to start casting the columns. The excavated pit is prepared with rubble soling and a PCC bed.

**Material used:** Steel reinforcements, cement concrete
**Generic dimension to be followed:** 2′ to 2′6″, with depth of 1′6″




Sloped Footing

Stepped Footing

** Reinforcement detail is indicative*

## 2. PLINTH

The plinth is the base on which the whole house rests. It has 3 components within it, as detailed below:

### Plinth Walls

Other than the foundation walls, these are walls within the plinth. They are of the same material as foundation walls but have a lesser depth than the foundation. The masonry walls are laid on top of a PCC bed over 1.5" jelly soling.

### Plinth Beam

A plinth beam is built at the plinth level or below the plinth slab level. Its function is to tie the structure together and transfer loads evenly across the foundation. Additionally, it prevents moisture from penetrating the structure and small cracks from eventually developing.

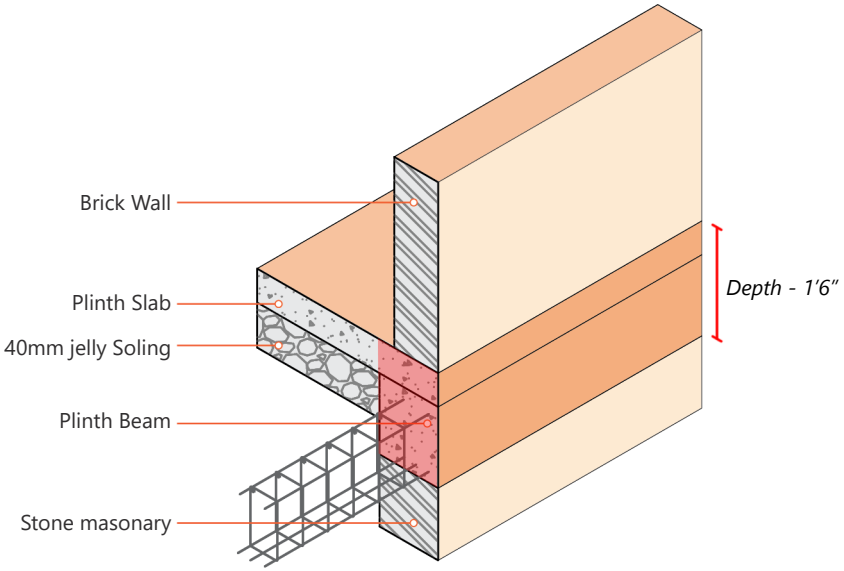
### Plinth Slab

The floor slab must level the space between the foundation and plinth walls and columns. This is usually a 4"-thick PCC bed laid over soling jelly. In some cases, the plywood slab may also be an RCC slab for further reinforcement and strength.

## Plinth in a Load Bearing Structure

The components of the plinth for a load-bearing structure are built above the foundation walls at the plinth level. The plinth beam rests on the foundation walls and transfers the load to the ground.

**Material used:** Steel reinforcement and cement concrete
**Generic dimension to be followed:** 1′ to 1′6″ depth, width to be matched with the stone foundation.

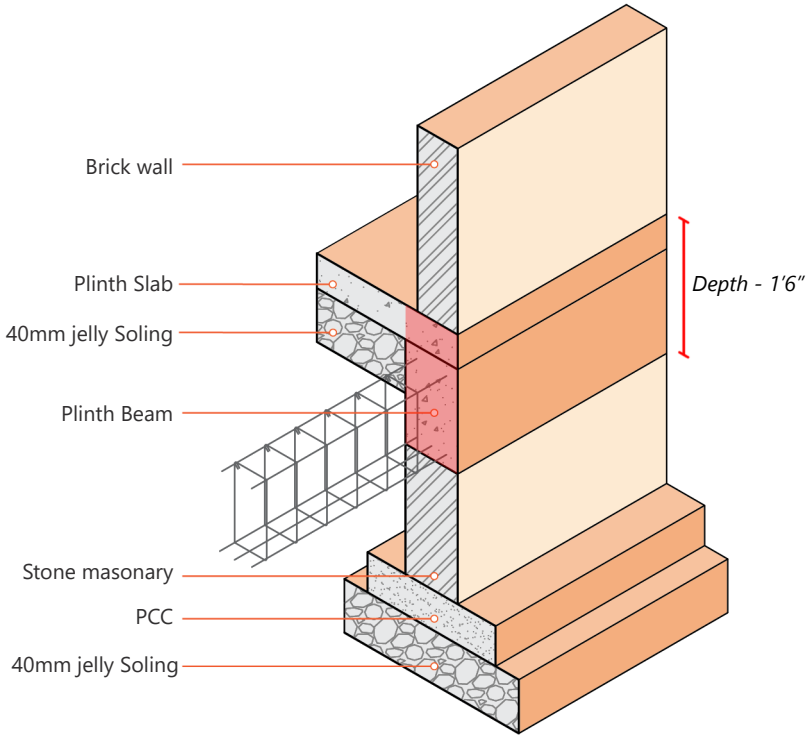



** Reinforcement detail is indicative*

## Plinth in a Column Beam Structure

The components of the plinth for a framed structure are built above the foundation at the plinth level. The plinth beam ties all the RCC columns together and transfers the loads to the foundation. The plinth beams rest on a shallow masonry foundation built between the columns.

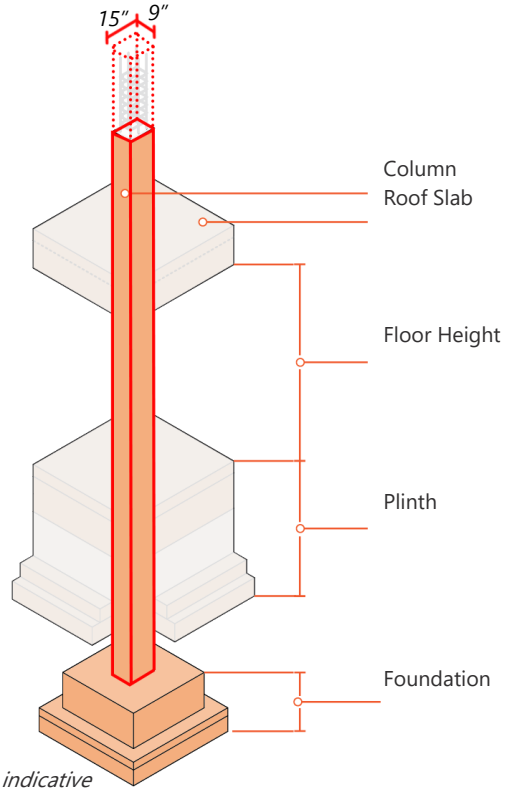
**Material used:** Steel reinforcement, cement concrete
**Generic dimension to be followed:** The width matches the width of the foundation while the depth varies to 1′ to 1′6″



## 3. COLUMN

The column is a very important vertical structural component of a house in a framed structure. It is cast from the foundation up to the roof level, with beams joining at different levels. A column transfers the load of the building to the foundation and the ground.

**Material used:** Steel reinforcement and cement concrete.
**Generic dimension to be followed:** (For a span of less than 13' to 15')
Column : 9" x 15"

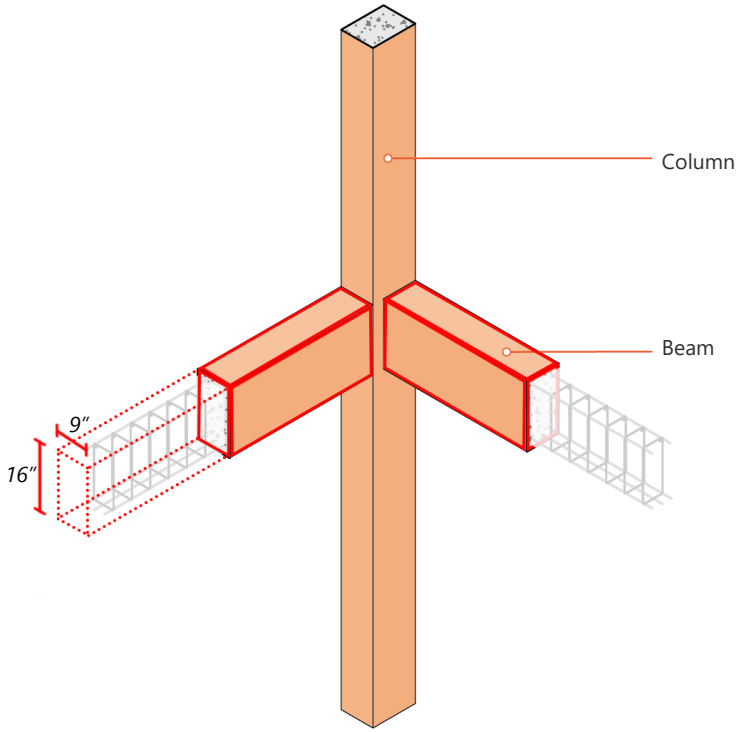



** Reinforcement detail is indicative*

## 4. BEAM

A beam is the horizontal component of the building that connects all the columns and floor slabs. It transfers the loads to the column before it is transferred to the foundation.

**Material used:** Steel reinforcement and cement concrete.
**Generic dimension to be followed:** (For beam spans less than 13′ to 15′) Beam : 9″ x 16″




** Reinforcement detail is indicative*

## 5. STAIRCASE

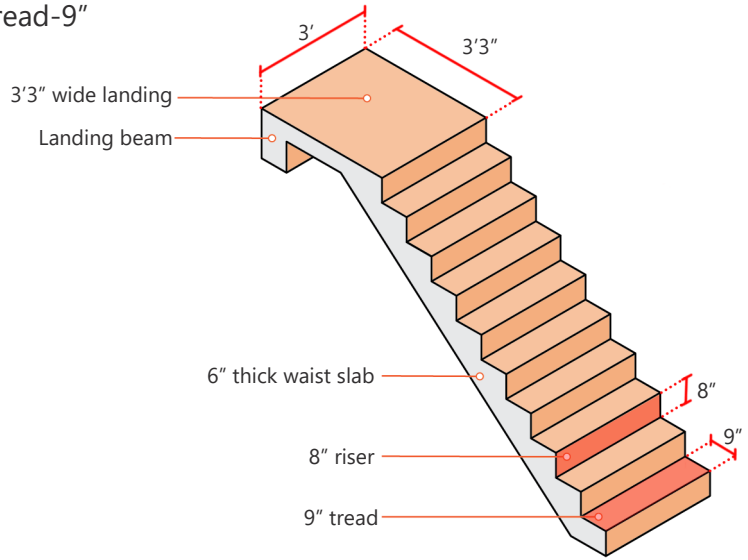
In small houses, the staircase is typically a U-shaped with two flights and a landing in between. It is usually constructed with the first flight longer than the second to provide extra headroom below the landing, which can be used either as a toilet or a storage space. The staircase in the house can be placed as per the household's convenience; however, in most cases, it is placed near the entrance to the ground-floor unit.

### Materials used:

1. Reinforced cement concrete
3. MS staircase

### Standard dimension to be followed:

Width of Staircase flight -3'
Width of landing -3'3"
Riser-8" & Tread-9"

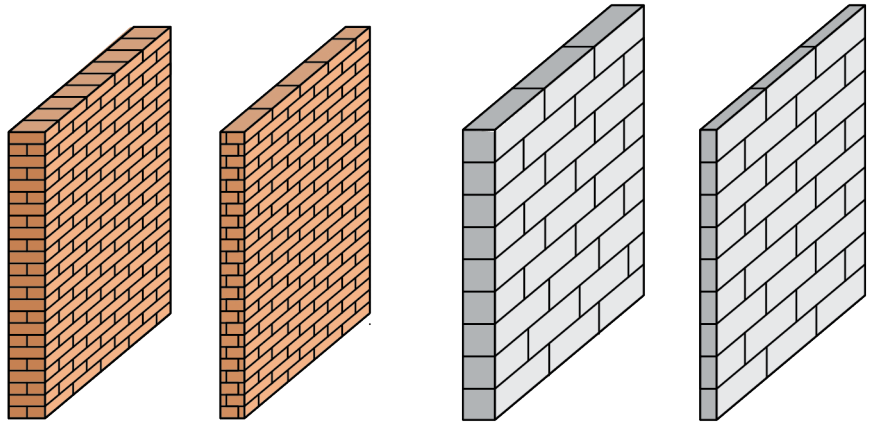


## 6. WALL

Walls are a fundamental component of houses as they protect the inside of the house and its occupants from all external elements, and define spaces within the house. Many factors play a role in selecting the type of material for the walls. The type of structure you choose for your house is the main factor, followed by the costs and local availability. The types of walls in a house would be as follows:

**External walls:** These are all the outer walls that are directly exposed to exterior elements—the sun, wind, and rain. These are usually thicker walls.

**Internal walls:** These walls separate the interior spaces and create rooms as per requirements. These walls could also be built only up to the bottom of the floor or roof slab, the sill level or lintel level, depending on the type of room.




Brick masonry wall

Cement block masonry wall

## Walls in a Load Bearing Structure

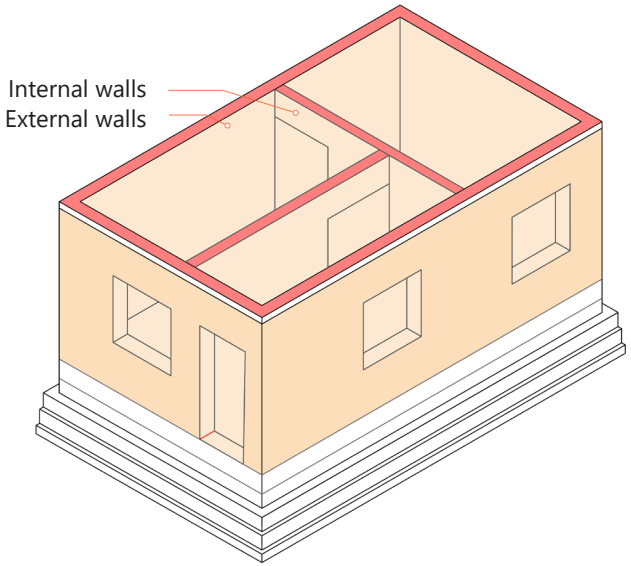
These walls are structural and take the loads of the slabs and beams and transfer them to the foundation of the house. Once constructed, these walls cannot be modified, as it would compromise the structural stability of the house.

**Types of material used for walls:**

1. Burnt red bricks
2. Solid cement blocks

**Generic dimension to be followed:**

For external and internal walls: 9" thickness



## Walls in a Column Beam Structure

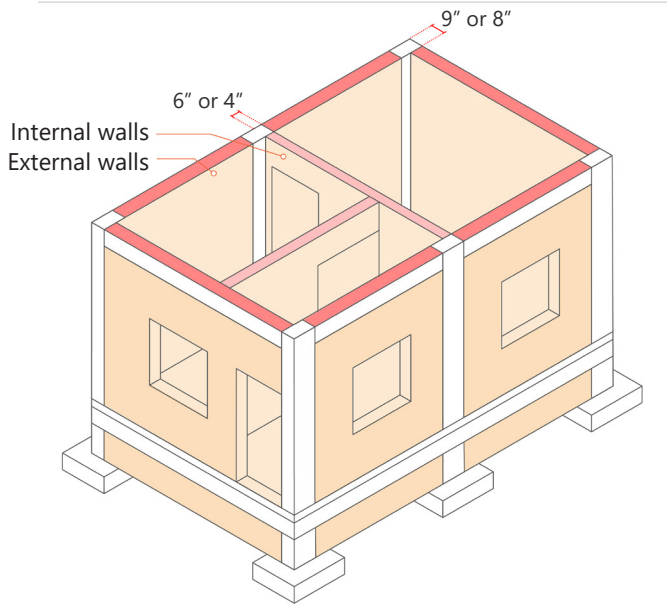
These are non-structural walls and allow flexibility for modification at a later stage. This also allows the usage of alternate materials, which can be a cost-saving factor. However, this would depend on the local availability of materials.

**Types of material used for walls:**

1. Burnt red bricks
2. Solid cement blocks
3. Hollow cement blocks
4. Flyash bricks

**Generic dimension to be followed:**

For an external wall: 9" - Brick wall; 8" - Concrete block
For an internal wall: 6" - Brick wall; 4" - Concrete block



## 7. SILL, LINTEL AND CHAJJA

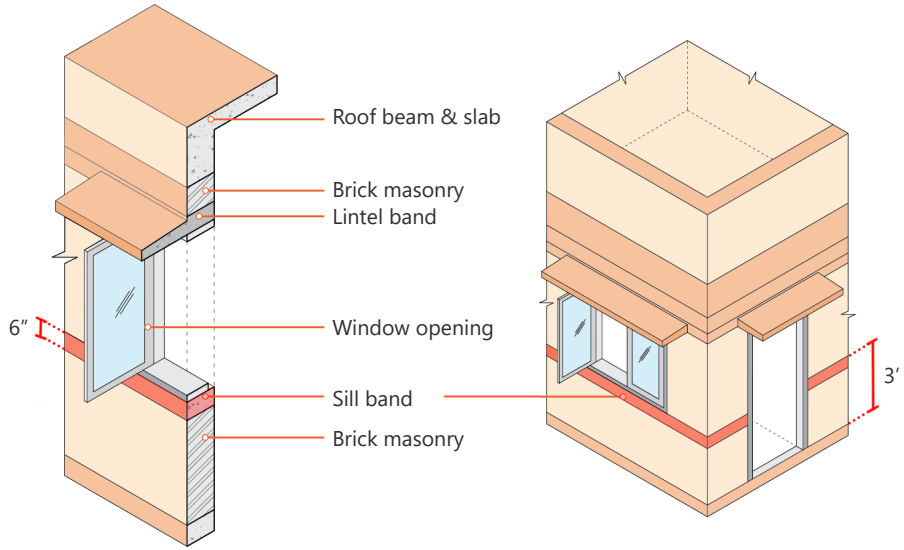
### SILL

The sill is a concrete band that runs horizontally at the bottom of the window. These run throughout the length of the masonry wall and provide structural support as well as hold the window in place.

**Materials used:**

1. Reinforced Cement Concrete
2. Stone Slabs
3. Wood Planks

**Generic dimension to be followed:** 6″ thick and placed at 3′ height.



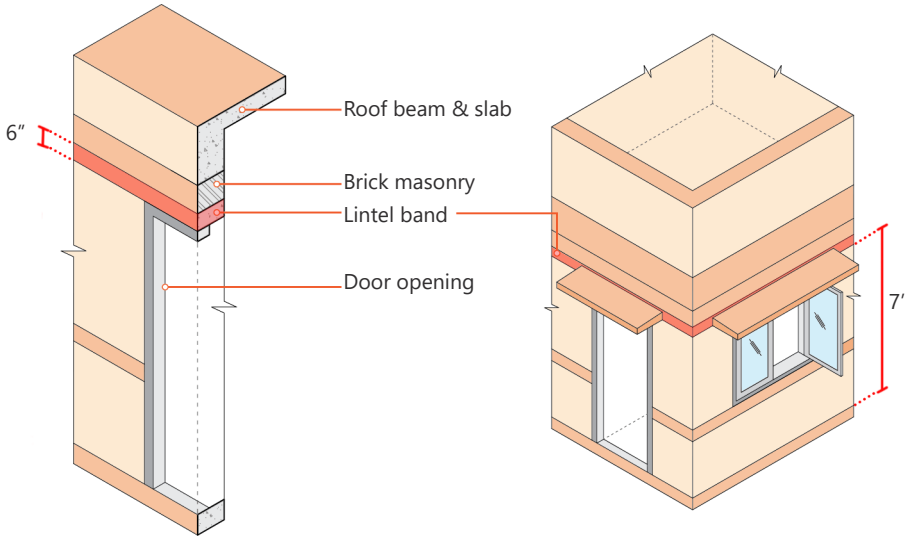
## LINTEL

Like the sill, the lintel is also a concrete band that runs horizontally above an opening. These run along the masonry wall, providing structural support as well as holding the masonry structure above any openings. In some cases, the top of the opening may be in line with the bottom of the structural beam and not require the additional lintel band.

**Materials used:**

1. Reinforced Cement Concrete
2. Stone Slabs
3. Wood Planks

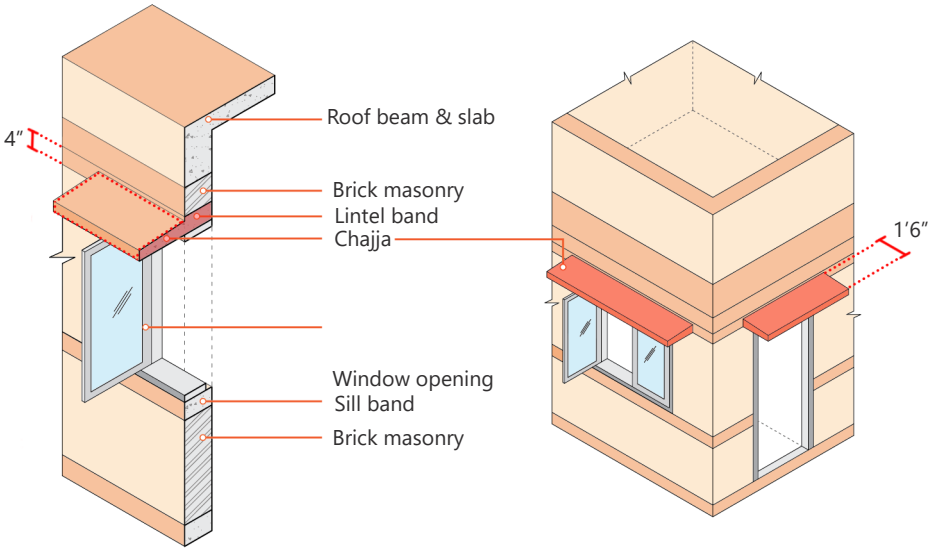
**Generic dimension to be followed:** 6″ thick and placed at 7′ height.



## CHAJJA (SUNSHADE)

The externally projected element above the opening is called the chhajja, or sunshade. It is important to have chhajjas for all external openings that are exposed to the external elements. It protects the opening, prevents rain from entering the house, and reduces glare from the sun.

**Materials used:** cement, concrete, wood, and sheet-asbestos.
**Dimension to be followed:** 1′6″ to 2′ projection and 3″ to 4″ thick

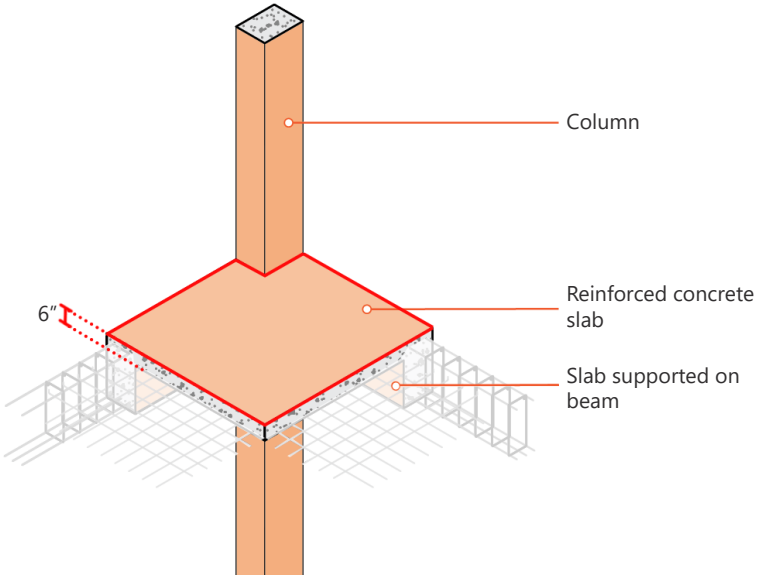


## 8. FLOOR SLAB

Slabs are horizontal structural members that support and distribute the loads on them. It forms the ceiling of the lower unit and the floor of the unit above. Floor slabs are connected to beams that either rest on load-bearing walls or are connected to columns in a framed structure. There can be one or more of these slabs, depending on the number of floors in the house. The floor slab could either be an RCC slab or a stone slab.

**Material used:**
RCC slab: Reinforcement bars, Concrete
Stone slab: Natural stone, Cement mortar

**Generic dimension to be followed:** 5" to 6" thick



## 9. ROOF

The roof is the topmost structural element of a building that covers the entire house and provides protection from external elements. The two types of roofs are:

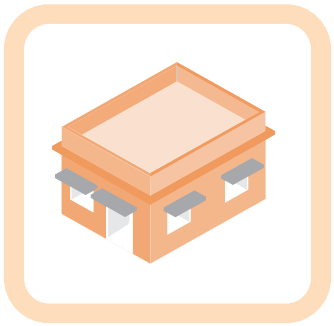
1. **Flat roof:** It is commonly used for houses. It is similar to a floor slab, but has additional water-proofing over it and is sloped to take out the rainwater.

2. **Sloping roof:** Sloping roofs can be either RCC, terracotta tiles, or metal sheets. Metal sheets and terracotta tiles both require a wooden or MS support system of rafters and purlins. These also require more maintenance over time than an RCC slab.

**Material used:**
1. Flat roof: RCC, Stone slab.
2. Sloping roof: Terracotta tiles, RCC, insulated metal sheets

**Generic dimension to be followed:** Depends on type of material. 5" to 6" thick for RCC slabs

Sloping roof



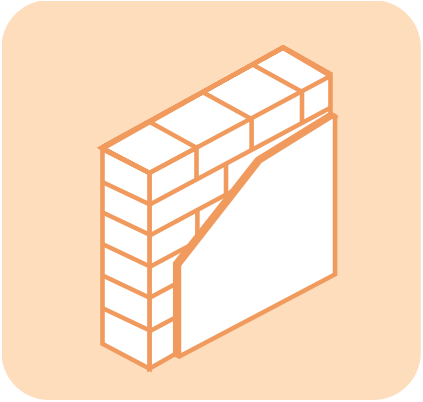
Flat roof

## 10. PLASTER

Plaster serves as a damp-proof coat and is made of a thin layer of mortar that is applied over the masonry, RCC column and beam surfaces. Plastering shields the surface from any external weathering impacts and provides an even surface. It offers a smooth and finished surface on the exteriors and interiors, which improves the appearance of the house and can be further enhanced with coloured paints.

**Types of plastering:**
1. Internal plastering - 1/2"
2. Exterior plastering - 3/4"

**Materials used for plastering**
1. Cement plaster
2. Lime plaster
3. Mud plaster



Brick wall with plaster

## 3.4 What building services does your house need?

### What are building services?

Building services are the mechanical, electrical and plumbing systems in the house. These are required for the smooth functioning of the house and may require periodic servicing. Good quality of building services ensures longevity and reduced costs in the long run.

### Mechanical Services

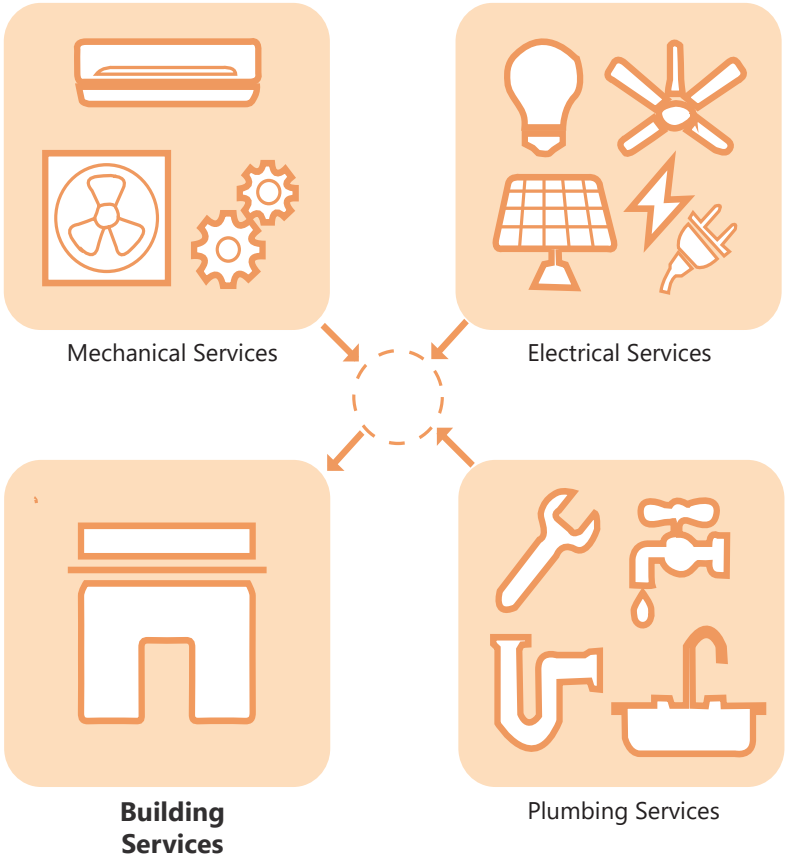
These include exhaust fans in the toilet and kitchen, and air-conditioning systems if required. These services are optional in a house.

### Electrical Services

These are all the electrical connections within the house including provisions for electrical appliances that may be bought at a later stage. Solar lighting provisions also comes under electrical services and are a good cost-saving option.

### Plumbing Services

These are all the toilet, kitchen, roof drainage and water supply provisions in the house. Rain water harvesting is also an efficient system for tapping rain water for either household usage or to recharge the ground water.


Mechanical Services
Electrical Services
Building Services
Plumbing Services

## ELECTRICAL SERVICES

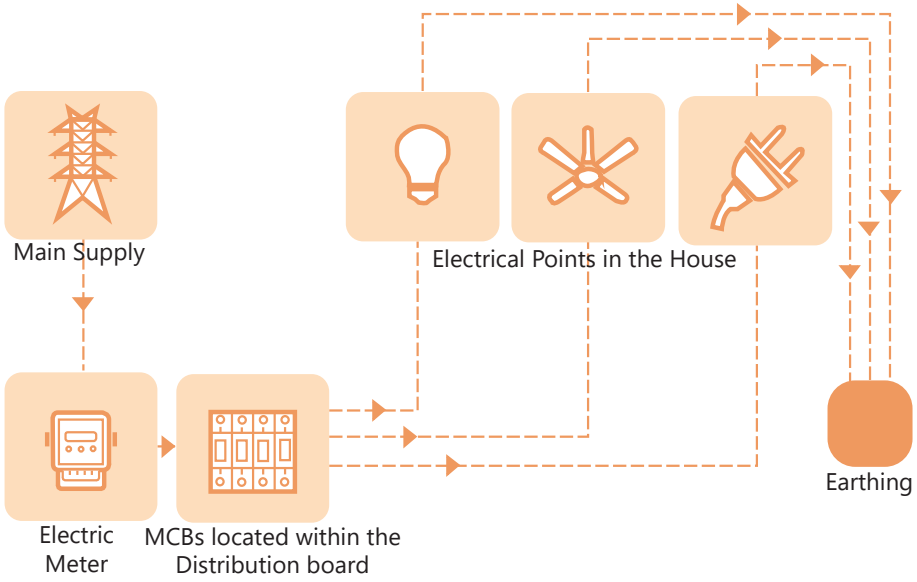
Electrical services are the distribution of electric power supply to households spaces safely. It includes setting up all electrical elements such as switches, outlets, and lighting, as well as providing access for electrical appliances.

In a house, electric power comes through government electricity supply connection and is distributed to individual houses through electric meters. The electricity is then transferred to the electrical points in the house through MCBs. All the electrical points have to be grounded for safety.

**Electric meter**
Electricity provided to a house must be metered based on usage. The electric meter should be located outside where it can be easily accessed by the electrical department representatives but should also be protected from the rain.

**Miniature Circuit Breaker(MCB)**
Miniature circuit breakers are single-pole switches that automatically switches off when excess current flows. These are located in the distribution board inside the house. Electricity is supplied from the MCBs to the individual electrical points in the house.

**Earthing**
It is the linking of the electrical points in the house to the earth. Earthing provides protection against electric shock and electrocution.




Notes

1. All materials used for house-wiring i.e., wires and accessories should be of good quality and have the Bureau of Indian Standard (BIS) Mark.
2. The number of points in a light circuit is not to exceed 10.
3. The switch boards can be fitted at a height of 5′ from the ground.
4. The horizontal run of the wiring on walls should be at a height of 10′ from the ground.
5. Use only three pin sockets in the house.
6. The minimum size of earthing wire is 0.4 sq.mm for aluminium wires.
7. The fuse wire should be connected to the phase wire only.
8. Connect all switches in the phase wire only.
9. Power Circuit shall have maximum 2 points

Outlined below are the number of components to be installed and total power requirements for a 1BHK and 2BHK house as per technical experts. These may change as per your family's requirement and your budget. Speak to your local electrician and plan the electrical layout of your house accordingly.

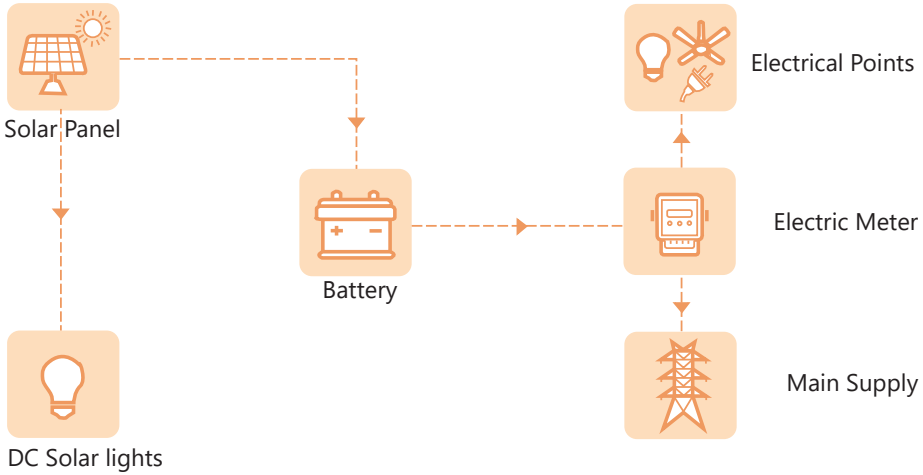
| Sl. No | Components | 1 BHK | | | 2 BHK | | |
|---|---|---|---|---|---|---|---|
| | | Nos. | Watts | Total | Nos. | Watts | Total |
| 01 | Lighting | 5 | 10 | 50 W | 6 | 10 | 60 W |
| 02 | 6A receptables | 5 | 100 | 500 W | 8 | 100 | 800 W |
| 03 | 16A receptables | 2 | 600 | 1200 W | 2 | 600 | 1200 W |
| 04 | Fan | 2 | 100 | 200 W | 3 | 100 | 300 W |
| 05 | Exhaust fans | 2 | 50 | 100 W | 2 | 50 | 100 W |
| 06 | Door bell | 1 | 100 | 100 W | 1 | 100 | 100 W |
| 07 | Pumps | 1 | 0.3 HP | 250 W | 1 | 0.3 HP | 250 W |
| 08 | TV outlets | 1 | 100 | 100 W | 1 | 100 | 100 W |
| 09 | TOTAL | 2.5kW | | | 2.9kW | | |
| 10 | Applying demand factors | 2500W / 230V = 10.86A | | | 3055W /2 30V = 13.28A | | |
| 11 | For future allowance & rounding to next standard size | 32A @ 230V singhe ph | | | 32A @ 230V singhe ph | | |

## Solar Lighting System

Solar lighting system collects energy from the sun during the day and stores it in a battery so that they can produce light at night. Solar cells, which convert sunlight directly to electricity, are used to power home lighting systems. Batteries are used to store the electricity, which is then utilised whenever needed.

Solar lights are considered for usage in houses as a green alternative to conventional lighting and for reduced energy costs. Although the panel and battery costs may seem high, the cost saving on electrical bills is high is the long run.

There are options available in the market for home solar panel systems depending on your requirement and budget. For any dark rooms that may need to be lit during the day time, there are DC solar light bulbs available that do not require to be connected to a battery. A few light points and charging points running on solar energy in the house can make a difference to the overall household electrical bill.

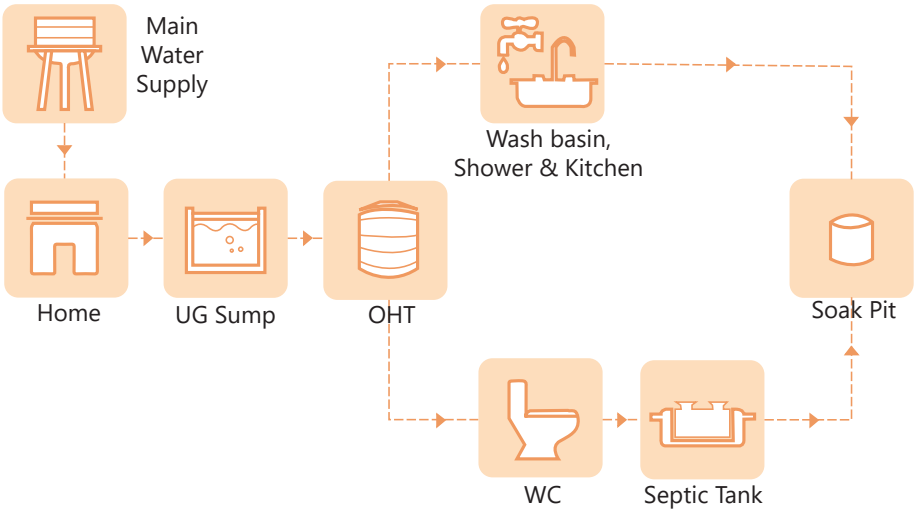


## PLUMBING SERVICES

Plumbing services consists of water supply and drainage of waste water, soil water (sewage) and rainwater. Through a planned network of pipes, water is supplied to the kitchen, bathroom and waste water is safely removed and disposed from the house.

Types of waste water from the house:

1. Grey water refers to the waste water generated in a house from wash basins, showers, kitchen sinks and washing machines. For waste water drainage, pipes with a minimum diameter of 3″ are typically utilised.
2. WCs and urinals produce sewage or soil water. Horizontal soil water pipelines should be laid at a steeper slope, such as 1:40. These are PVC pipes and have a minimum diameter of 4″.



In most houses, water supply is taken directly from the main water supply line. In such cases, when the main water supply is cut off, the household is without water. This can be resolved by providing an overhead tank and an underground sump that stores water for emergency use.

**Underground Sump (UG SUMP):** A concrete chamber used to store water below ground level is known as an underground sump. The stored water from UG tank needs to be pumped up to the OHT to be used in the house.

**Overhead tank (OHT)**: An overhead tank is a water storage tank that is placed on the house rooftop. Positioning it on an elevated surface maximises efficiency by distributing water with uniform pressure and flow to every outlet. High power pumps are required to pump water to the OHT.

**Septic tank:** It is a rectangular underground tank with partitions and is used to treat soil water from WCs. While solid waste from the water settles at the bottom, wastewater is disposed off to the soak pit. It is always loaded with sewage that has to be physically removed occasionally. A septic tank will work better if less water is added to it.

**Soak pit:** A soak pit is cylindrical in shape with porous brick sides that is covered in gravel. It receives grey water and is also connected to septic tank from which the waste water is received. The treated water is discharged to the ground through the porous walls of the pit. It should be located away from an occupied building, any water bodies or water supply pipes. It cannot be used in areas with high water tables since groundwater will then seep in and flood the area.

The capacity for the components of the plumbing system depending on the number of family members is detailed here. The components incorporated in your house may differ as per local conditions and your budget. Speak to your local plumber and plan the system in your house accordingly.

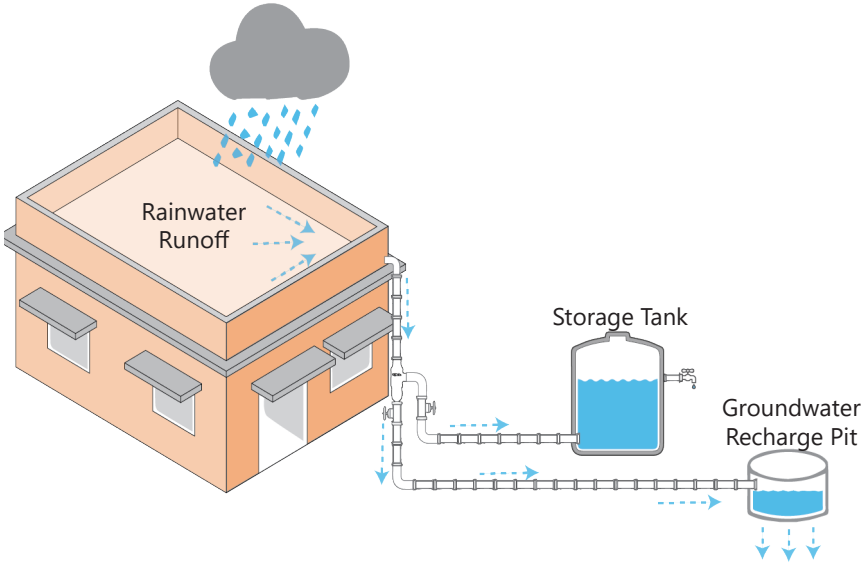
| SI.No | Services | Family - 4 members | Family - 6 members | Family - 8 members |
|---|---|---|---|---|
| 01 | Underground sump capacity (UG sump) | 2000 litres | 3000 litres | 5000 litres |
| 02 | Overhead tank capacity (OHT) | 300 litres | 500 litres | 750 litres |
| 03 | Septic tank capacity | 42.3 cu.ft. | 70.6 cu.ft. | 88.2 cu.ft. |
| 04 | Septic tank size (LxB) | 4'3" x 2' 5'10" depth | 5'3"x 2'8" 5'10" depth | 5'10" x 3' 5'10" depth |
| 05 | Soak pit size | 2' dia 6'7" depth | 2'8" dia 6'7" depth | 3' dia 6'7" depth |

## Rainwater Harvesting System

Rainwater harvesting is a simple method for collecting and storing rainfall for later use. Rainwater that has been collected from surfaces may be filtered, stored, or it may be used directly for groundwater recharge. It can be used for a variety of purposes, such as watering gardens, livestock, irrigation, and for domestic use with proper treatment.

Rain water harvesting can be done in two ways:

1. **Storage for direct use:** This is the most effective way of rainwater harvesting. Water is collected from roof and stored in a barrel or storage tank for later use.
2. **Recharging ground water:** Water is recharged to ground through recharge pits, dug wells, bore wells, soak pits, recharge trenches, etc.

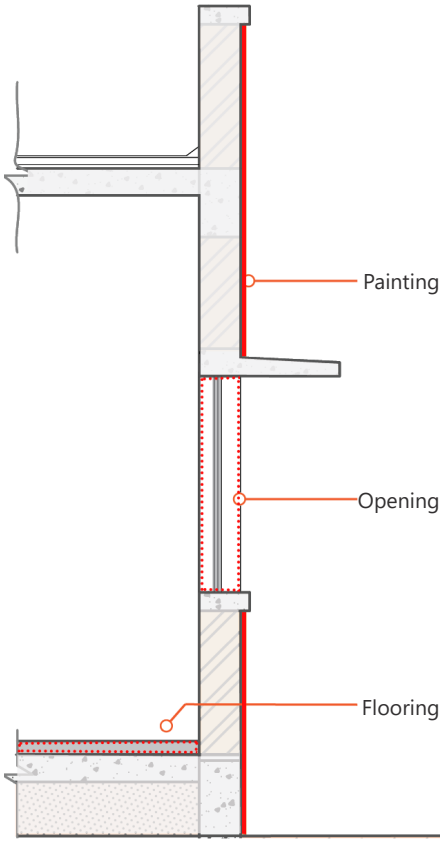


## 3.5 What type of finishes should you select?

The building's final phase of construction involves finishes to create the final surface of the house. Finishes can be decorative and provide a protective covering that shields them from damage and weathering and usage impacts. The finishes include the painting, tiling, and carpentry work. This can be done in any order.

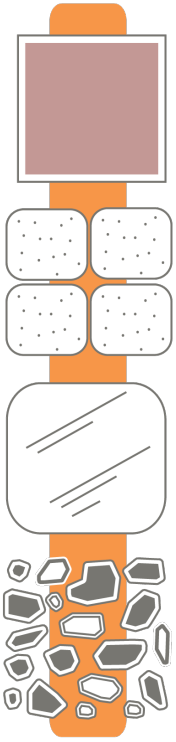
In this section, we will go through the materials for finishes. These can be selected as per your preference and budget.

1. Flooring
2. Painting
3. Openings- Door & Windows



## 1. Flooring

Flooring is a permanent covering in the interior of the house over the floor slab with a finished material to provide a smooth and even walking surface.



**Material used:**

**Oxide flooring:** Oxide flooring is a type of flooring that is cost-effective, durable and easy to maintain. Different types of colour pigments are added to obtain different colours of oxide flooring.

**Vitrified tile flooring:** Vitrified flooring tiles are one of the most popular and affordable types on the market. Vitrified tiles are available in glossy, matte, and anti-skid finishes.

**Ceramic tile flooring:** Ceramic tile is a suitable choice for many areas of the home, whether it's walls, floors, countertops, or dado. It's resistant to moisture, stands up to stains, and won't absorb bacteria or odours.

**Stone flooring:** Stone flooring is hard, durable, affordable, simple to install, and simple to repair. The typical natural stones used for flooring are marble, granite, etc.

## 2. Painting

The final stage of any construction is painting. It is applied to buildings for aesthetic value, surface durability, chemical protection, and pest protection. Different types of paint are intended for particular applications. It is recommended that you finish the flooring before beginning to paint your house.

Process:
1. Mix the putty
2. Coat of putty
3. Sanding the uneven surface
4. Coat of primer
5. Mix the paint
6. Apply 2 or 3 coats of paint

Mix the putty

Apply Putty

Sand the surface

Apply Primer

Mix the paint

Apply 2 or 3 coats of paint

## Types of paints

**1. White wash or lime paint**

It is very low cost and used for whitening walls. It can be used as a protective coating for the walls and can be directly applied to the surface. Whitewashing also acts as an insect repellent and protects your house.

**2. Distemper paint- Interior**

Acrylic distemper paint of the highest quality gives the walls a perfectly smooth matte finish.

**3. Emulsion paint**

Emulsion paint is a type of paint that contains resins that allow for quick drying, good workability, and durability.

**4. Enamel paint**

Enamel could be used in varnishes, paints, and coatings. After drying, it produces a hard and glossy finish - an enamel-like surface that has a bright lustre.

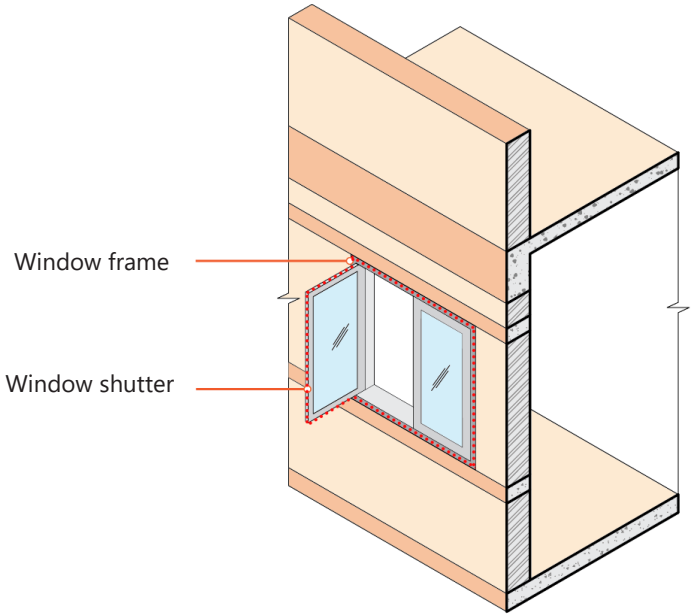
**5. Cement base paints**

It is used for painting exterior wall surfaces, mainly to prevent water penetration and reduce dirt collection. It is suitable for coating concrete as well as decorating indoor and outdoor walls.

## 3. OPENING : DOORS AND WINDOWS

Windows are generally provided in external walls only. A window has two components: frame and shutter. The frames make up the outer support of the window and are connected to the wall with hold-fasts. The shutters are the hinged or sliding part of the window.

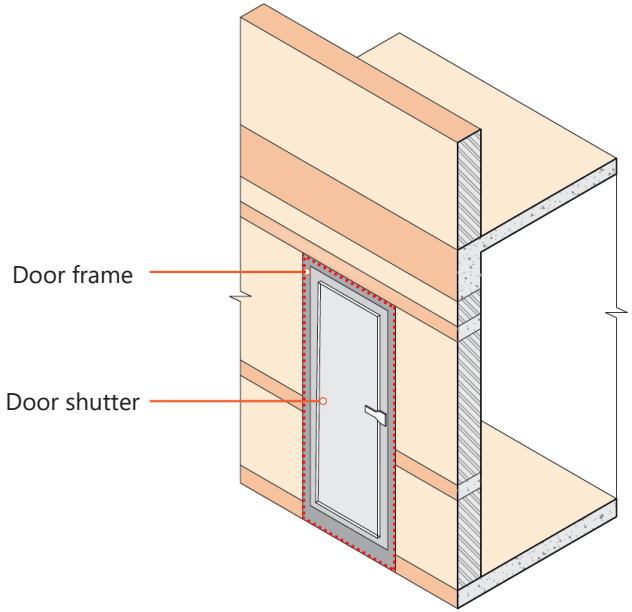
**Type of Window:** Casement or Sliding or Louvered (for toilets)
**Material used:** Wood, aluminium and UPVC.



Like a window, the door also has two components: frame and shutter. The frames make up the outer support of the window and are connected to the wall with hold-fasts. The shutters are mostly hinged.

**Type of Door:**
1. Single shutter door
2. Double shutter door

**Material used:** Wood, aluminium and MS; PVC for bathrooms only.



# 4. BUILDING ILLUSTRATIONS

## 4.1 Plan Illustrations

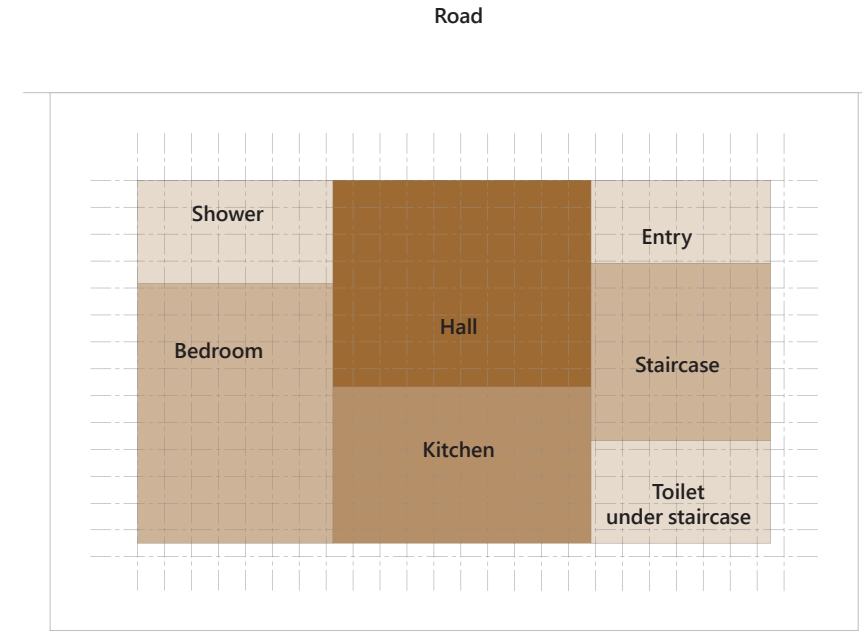
According to norms and general minimum requirements taking into account family units and vaastu, a general design of the plot dimensions stated along with floor plans are prepared here.

The spaces have been placed on the grids after leaving the necessary setbacks. These can be modified as per each family's requirements. The standard plot sizes have been followed to prepare the plans, however these may vary by several feet for your own plot.

These plans are to be used as a reference to design your own home. There are some blank pages with 1'x1' grids at the end of this chapter for you to use to draw the plan of your own home.

# Zoning Design of Plot Type 1 - A

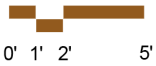
30'x20' Plot Area



# Floor Plan Design on Plot Type 1 - A

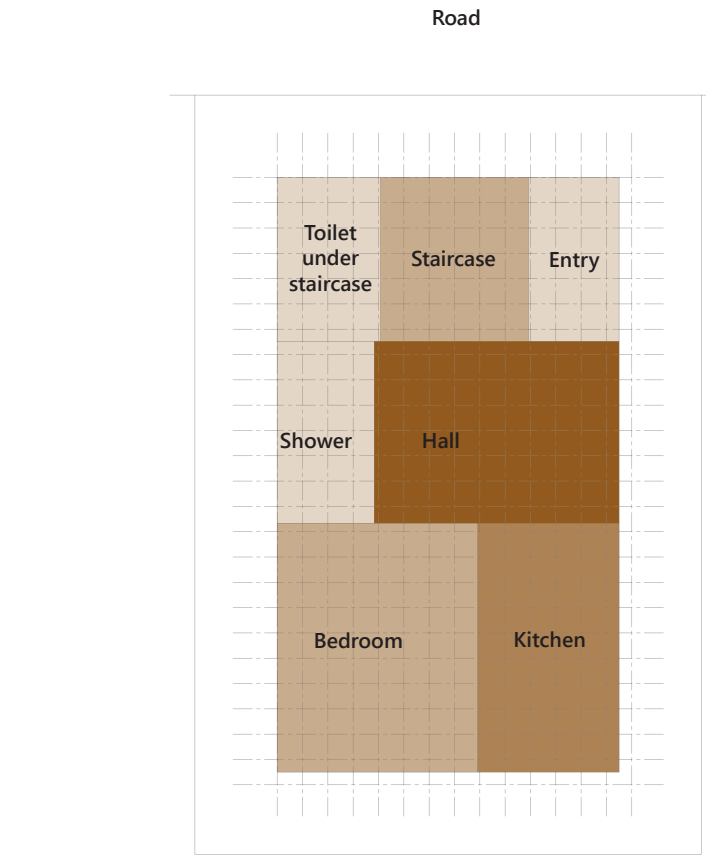
30'x20' Plot Area


Plot area : 600sft., Built-up area : 336sft.



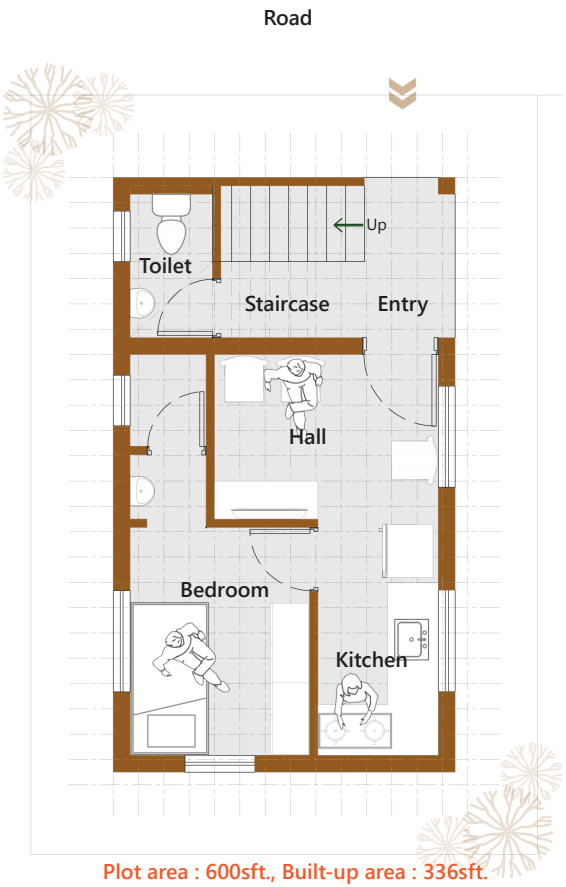
## Zoning Design on Plot Type 1 - B

20'x30' Plot Area

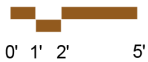


# Floor Plan Design on Plot Type 1 - B

20'x30' Plot Area

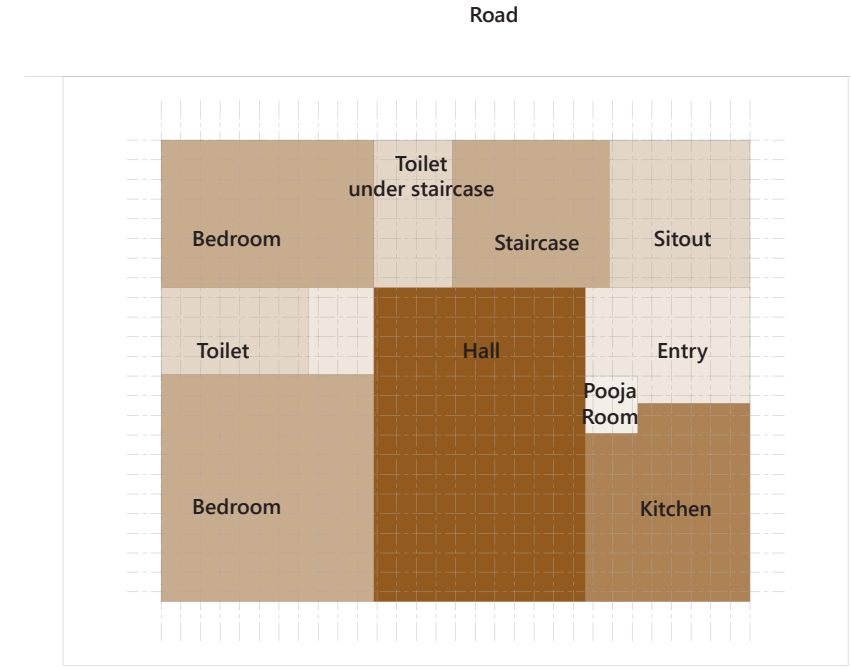



Plot area : 600sft., Built-up area : 336sft.



## Zoning Design on Plot Type 2 - A

40'x30' Plot Area



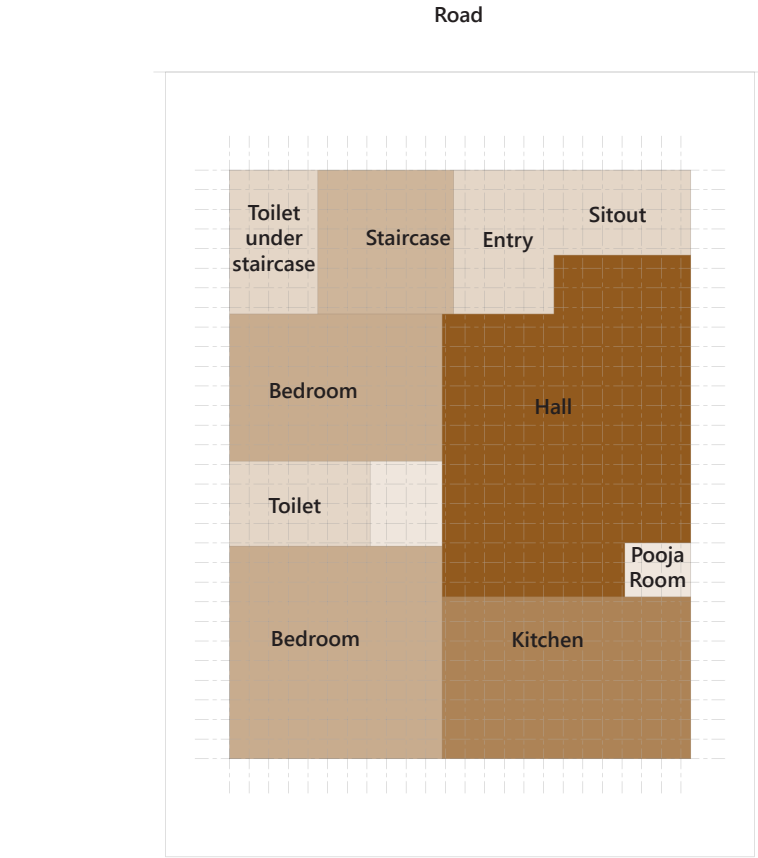
# Floor Plan Design on Plot Type 2 - A

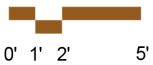
40'x30' Plot Area


Plot area : 1200sft., Built-up area : 705sft.

## Zoning Design on Plot Type 2 - B

30'x40' Plot Area

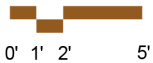


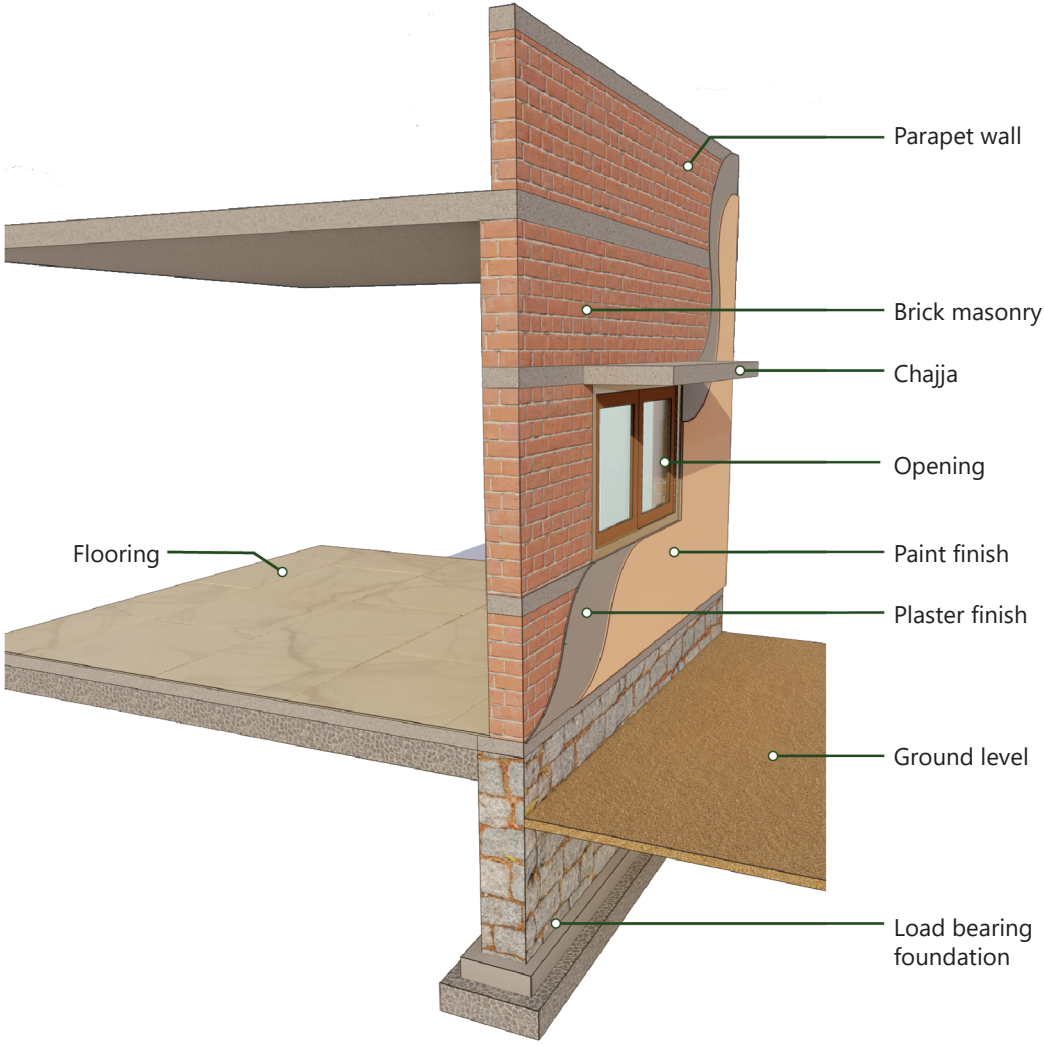
# Floor Plan Design on Plot Type 2 - B

30'x40' Plot Area


Plot area : 1200sft., Built-up area : 705sft.

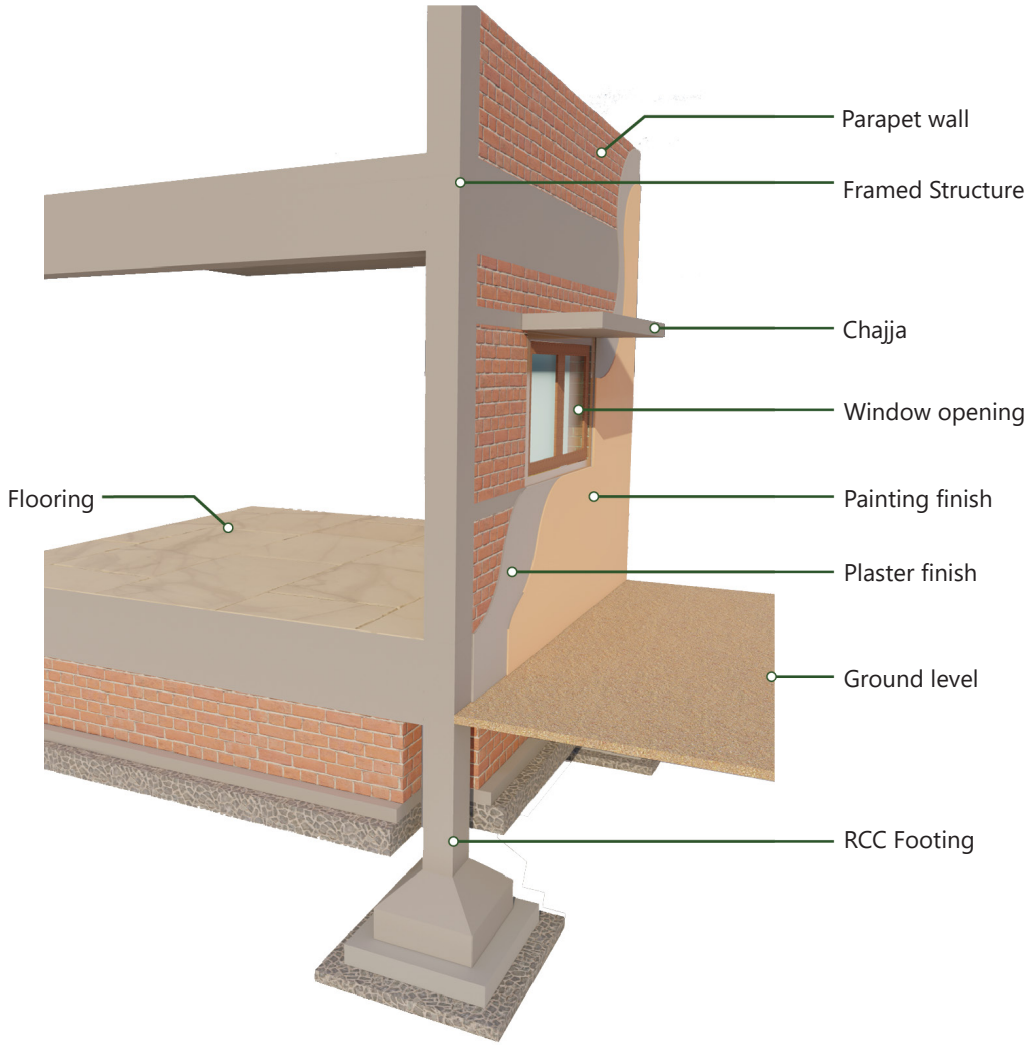


## 4.2 Sectional View of Load Bearing Construction

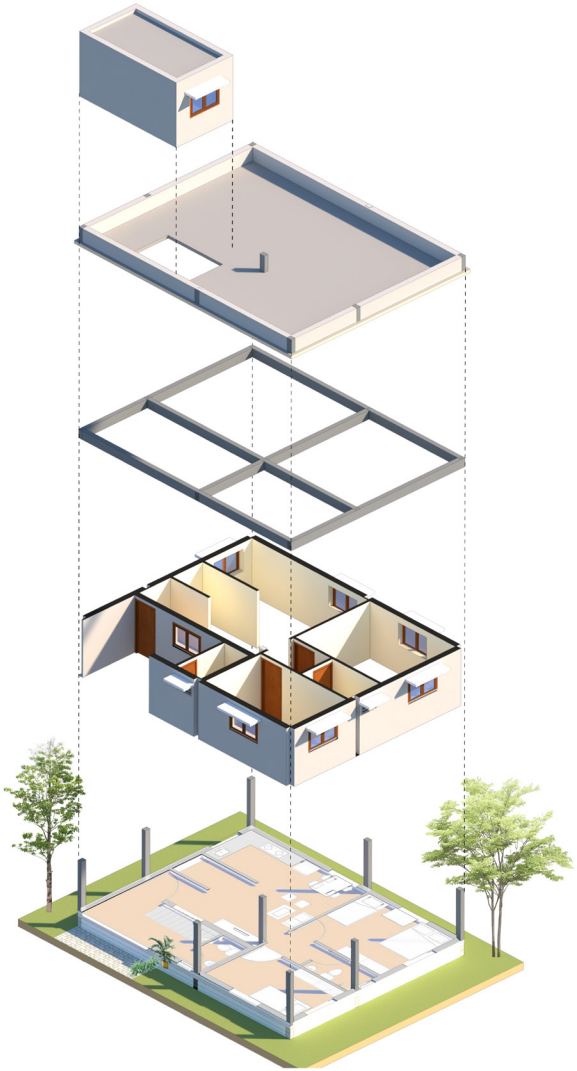


## 4.3 3D Illustration of Load Bearing Construction

## 4.4 Sectional View of Column and Beam Construction



# 4.5 3D Illustration of Column and Beam Construction

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