Guidelines for Safer House Construction

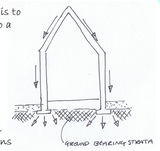
Construction Details

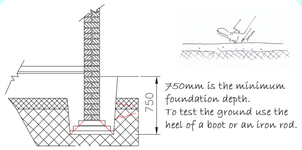
DEPTH OF FOUNDATIONS

The function of foundations is to transfer the building loads to a ground bearing strata.

Foundations need to be deep enough to protect them from erosion, surface water, and tree roots.

The depth of foundations will be dependant on site conditions

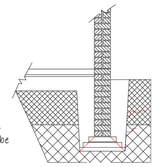


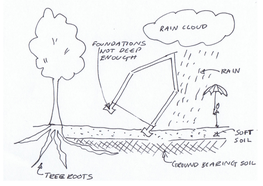


750mm is the minimum foundation depth.
To test the ground use the heel of a boot or an iron rod.

FOUNDATIONS SHOULD NEVER BE CONSTRUCTED ON MADE UP GROUND

If the ground is soft then foundations will have to be dug deeper.

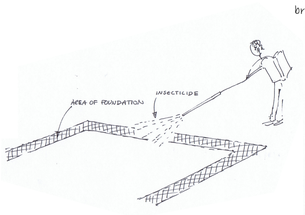




FOUNDATION CONSTRUCTION

Anti termite inseoticide

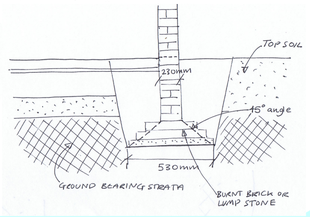
Where it is afforded, anti termite inseoticide should be applied to the soil around the foundations. The effectiveness of the treatment will depend on the brand and supplier.

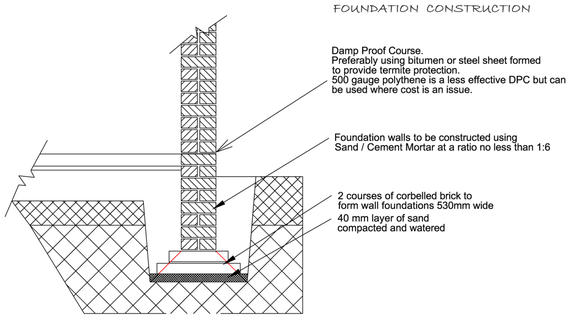


Foundation Construction

Foounadations should be constructed on a 40mm compacted layer of sand. Burnt brick or lump stone should be used for foundations.

Where the wall is 230mm wide and there are two courses of brick, then the footing will be a total 530mm wide

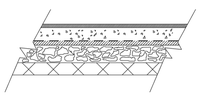




INFILL & DAMP PROOF MEMBRANE

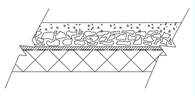
The ground floor can be constructed in a number of different ways. A Damp Proof Membrane (DPM) using 500 gauge polythene (plastic paper) should be installed to prevent damp rising through the floor.

Example 1



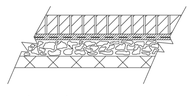
1. 20mm Sand / cement screed
2. 75mm concrete
3. DPM
4. Sand blinding
5. Crushed brick/stone
6. Compacted subsoil

Example 2

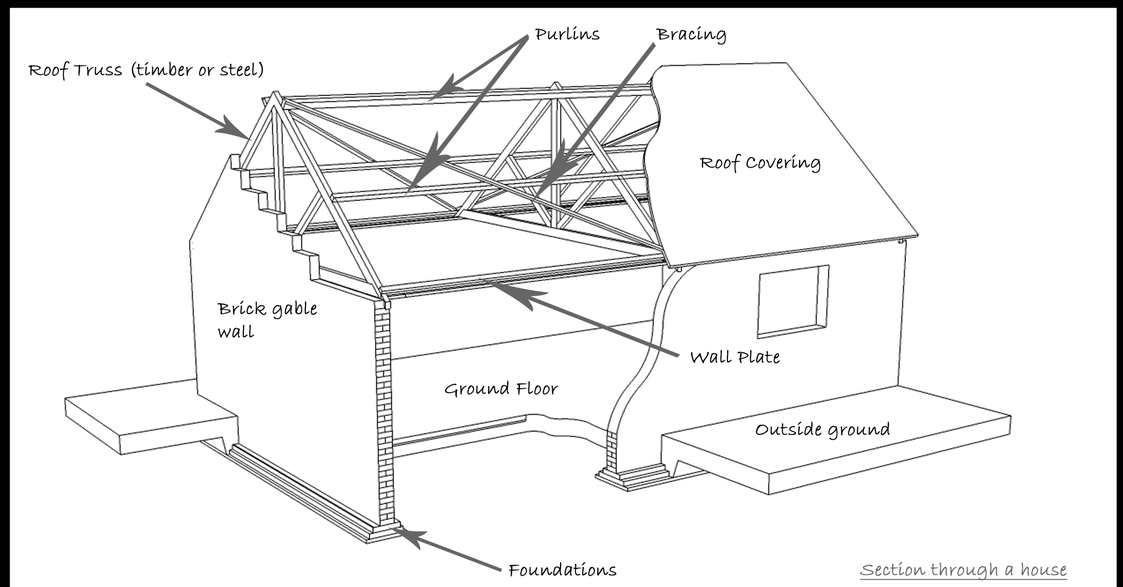


1. 50mm floated concrete
2. Crushed brick / stone
3. Sand blinding
4. DPM
5. Compacted subsoil

Example 3



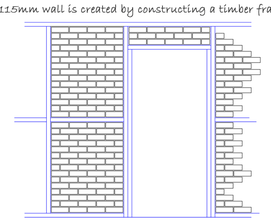
1. Brick paving
2. Sand bedding
3. DPM
4. Sand blinding
5. Crushed brick / stone
6. Compacted subsoil



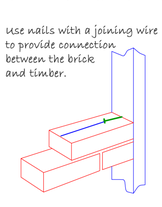
Section through a house

STABILISING INTERNAL WALLS

115mm wall is created by constructing a timber frame and brick between the timber



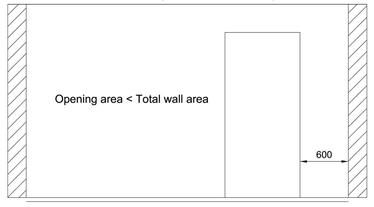
Timber stud wall with brick infill



Use nails with a joining wire to provide connection between the brick and timber.

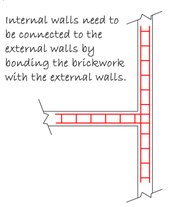
Nail fixed at every 3rd course

The position of internal openings effects the performance of the wall.

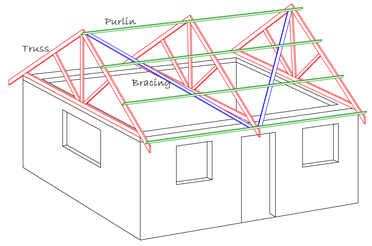


Doorways and openings should be 600mm from the junction with external walls.

Internal walls need to be connected to the external walls by bonding the brickwork with the external walls.



ROOF STRUCTURE



ROOF TRUSSES

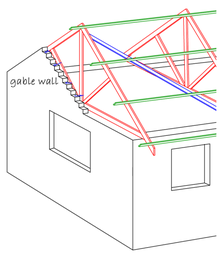
To eliminate high unsupported masonry it will be necessary to construct the roof using trusses.

Roof trusses will normally be constructed from timber, which is affordable.

The roof trusses support purlins which in turn support the roof covering.

The roof must then be braced with 100 x 50mm timber to prevent movement from wind loads and earthquakes.

Generally purlins should not be less than 100 x 50mm in section.



Masonry Gable Walls

Where masonry gable walls are constructed these should not be load bearing and should be fixed to the truss to provide support and stability against wind load.

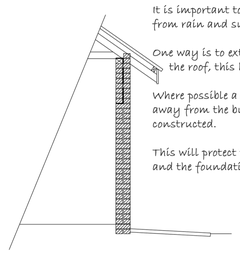
The timber truss should be fitted in place and then a single thickness (115mm) wall constructed using the truss as a form.

Using wall ties, the brickwork is attached to the truss.

In the event of an earthquake the brickwork gable may collapse but the roof structure will remain.

IT IS VITAL THAT BRACING IS FITTED TO THE ROOF FOR THIS DETAIL TO WORK.

SURFACE WATER DRAINAGE

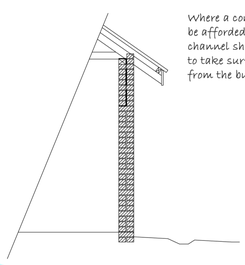


It is important to protect the building from rain and surface water.

One way is to extend the overhang of the roof, this helps protect the wall.

Where possible a concrete path, sloping away from the building should be constructed.

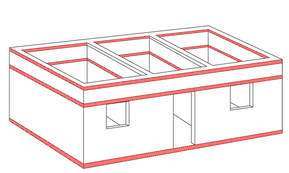
This will protect the base of the wall and the foundations.

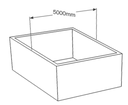


Where a concrete path cannot be afforded, a drainage channel should be constructed to take surface water away from the building.

RING BEAMS & INTERNAL WALLS

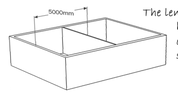
The wall can be supported along its length with introduction of ring beams.





Wall lengths should be no longer than 5m without having additional bracing.

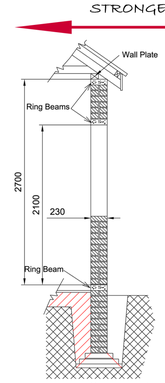
Ring beams and internal walls provide longitudinal support for walls.



The length of wall can be reduced by the introduction of piers or by being braced and supported by internal walls.

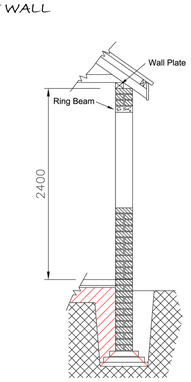
RING BEAMS AND HORIZONTAL REINFORCEMENT ARE ESSENTIAL FOR SEISMIC RESISTANT DESIGN

STRONGEST WALL

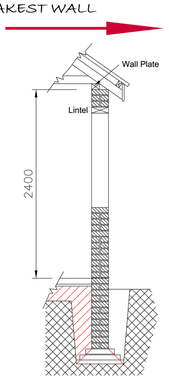


230mm wall constructed with ring beams at plinth lintel, and wall plate

WEAKEST WALL



230mm wall constructed with one ring beam at lintel height



No ring beams with lintels fitted over doors and windows

BONDING FOR MASONRY WALLS

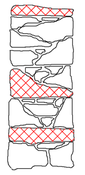
Masonry walls constructed of brick, earth, and stone need to have sufficient bonding.
The most cost effective and strongest bond is to use the walling material as demonstrated below

Example 1

Brick Force Wire installed every 4th course. Must have cement mortar to be effective.

Example 2.

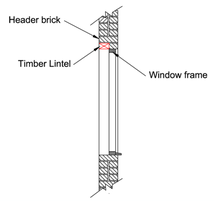
Brick header bond at every 4th course. Provides connection regardless of mortar used.

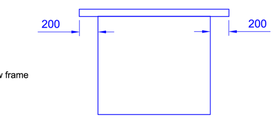


Example 3.

Tie stones built into the wall at spacing maximum 600mm vertically and horizontally

LINTELS OVER WINDOW & DOOR OPENINGS



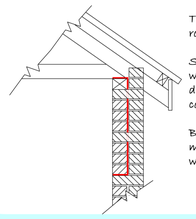


Concrete lintels are best used, but can be expensive.

An affordable solution, although not as strong, is to use a timber lintel

Lintels should be fitted over doors and window openings and extending a minimum 200mm beyond the opening.

WALL PLATE FIXING



The wall plate is the junction between the roof structure and the wall.

So that the roof provides bracing to the walls and that the roof is tied down, there needs to be a suitable connection.

By building walls ties into the masonry at 600mm centres, the wall plate can be secured.