INTRODUCTION

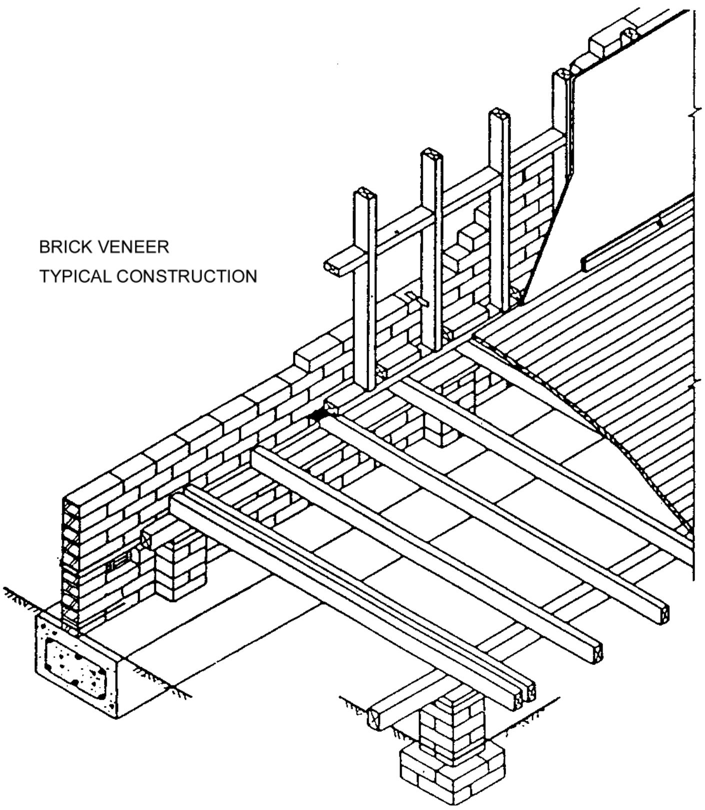
BRICK/MASONRY VENEER CONSTRUCTION

Brick or Masonry Veneer is a development from the timber framed building. Early buildings in Australia were constructed of timber as it was readily available and could be easily worked by the builders. More substantial buildings of brick or stone were erected for important buildings and wealthy landowners.

Brick veneer cottages became popular in the 1950's as they were cheaper to build than cavity brick houses but required less maintenance than weatherboard or fibrecement sheeting.

Today Masonry Veneer Construction accounts for 65% of new housing starts in NSW and is a popular, quick, economical construction method used in new housing construction in Australia, New Zealand, America, Europe & Asia.

Many small masonry contractors rely on this type of work for their primary source of income and this industry accounts for a significant proportion of employment for many Mason Bricklayers & Apprentice Bricklayers.



ADVANTAGES OVER OTHER CLADDINGS

* Low Maintenance - no painting
* Durability - resists weather, impact and abrasion
* Appearance - large variety of bricks and finishes
* Higher resale value than timber frame construction

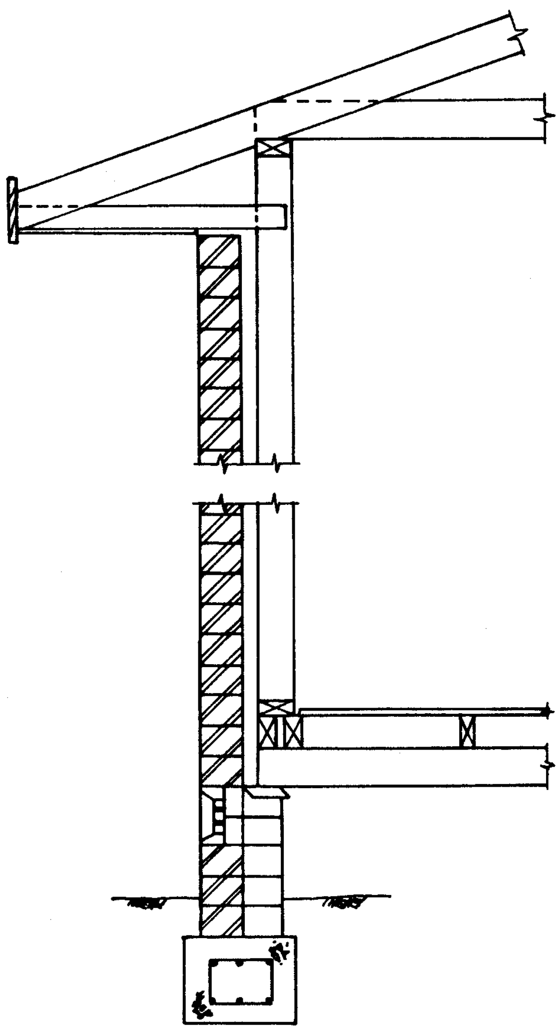
BRICK/MASONRY VENEER

This section will enable you to demonstrate an understanding of the construction details and principles of masonry veneer construction.

BRICK VENEER TYPICAL CONSTRUCTION

Brick veneer construction generally uses:

* Strip footings or slab on ground footings.
* Timber or steel structural framing systems.
* Concrete slab on ground or suspended timber floor.
* Non load bearing veneer of masonry tied to structural framing.
* A cavity separating the masonry and framing.
* Single or two storey construction.
* Trussed or conventional roof system



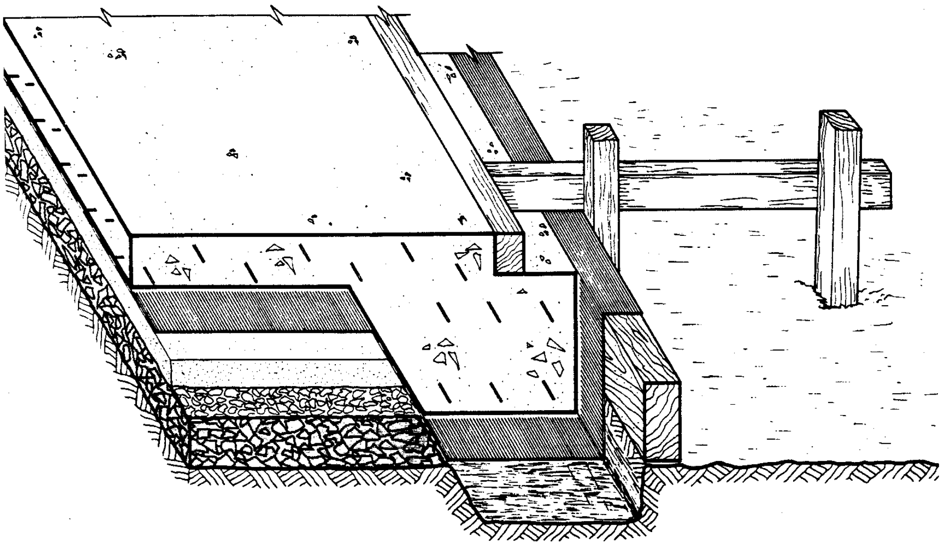
FOOTINGS

AS 2870 - 1996 Australian Standard for Residential slabs and footings - Construction. This standard sets out the requirements for the classification of a site & the design & construction of a footing system for a single dwelling house, townhouse or similar industrial or commercial buildings.

SLAB ON GROUND

In NSW a reinforced concrete slab on ground with an integrated edge beam is generallydesigned and certified by an engineer.

Local councils & lending institutions may also have specific requirements.



Rebate

A rebate with a minimum depth of 20mm is formed to allow an approved flashing to be turned down & divert water away from the internal wall and to the external masonry wall

Binding

Average depth 50mm sand blinding is spread evenly under the slab to protect the waterproof membrane, provide an even base & facilitate drainage. If it's depth is greater than 100mm it must be compacted.

Waterproof Membrane

Minimum 0.2mm polythene vapour proof membrane lapped 200mm and taped with waterproof pressure sensitive tape to the underside of the slab and sealed around all pipes or projections. The membrane may be returned up to the main D.P.C./flashing and protected from damage or terminated at the edge beam.

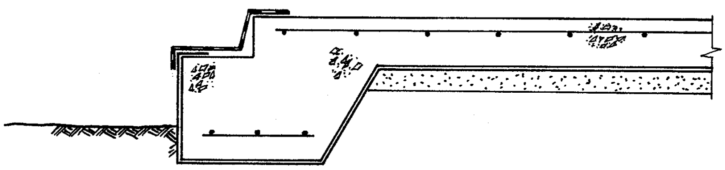
DAMP PROOF COURSES FOR SLAB ON GROUND DPC/ FLASHING AS/NZS 2904: 1995

An approved DPC / Flashing as specified Australian/New Zealand Standard 2904: 1995 Damp - proof courses and flashings - must be built in as the work proceeds to prevent moisture reaching the inside of the building.

Approved DPC / Flashing

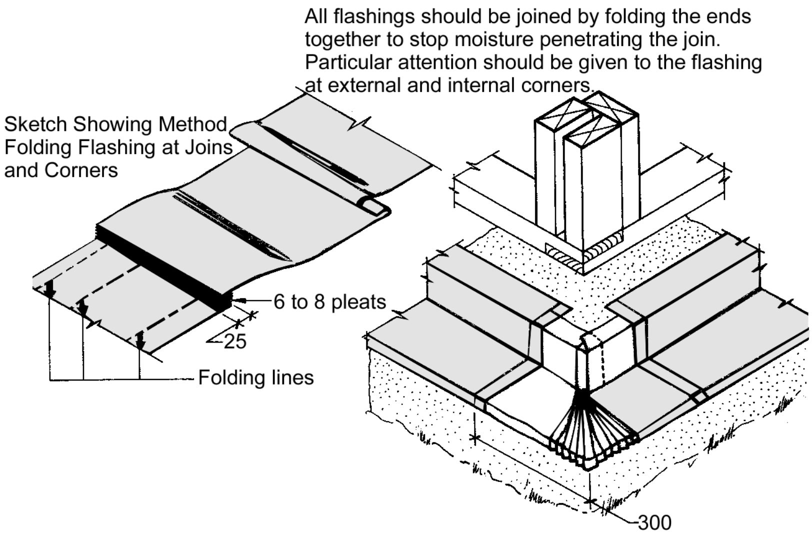
Metals - aluminium, copper, lead, zinc, zinc-coated steel
Aluminium/Zinc-coated steel
Bitumen-coated metals e.g. Alcor"
Polyethylene-coated metals
Bitumen impregnated materials without metal centre
Polyethylene e.g. Viscourse

Location of DPC / Flashing



Folding Flashing At Joins And Corners

Flashings should be joined by folding the ends together to stop moisture penetrating the join. Particular attention should be given to the flashing at external and internal corners.



Weepholes

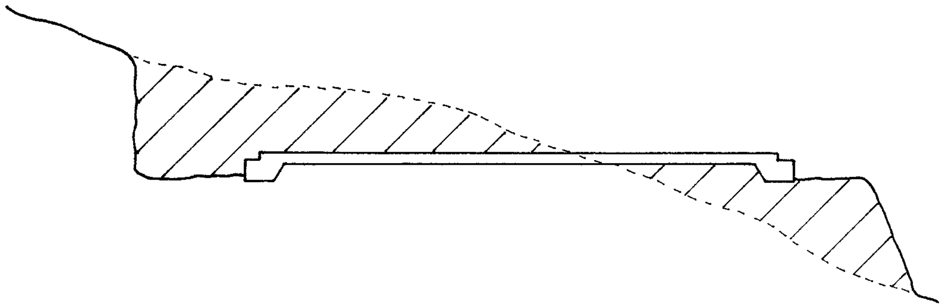
Minimum 150 above finished ground level.
Every 3-4 Standard bricks or 1000 centres maximum.
They allow water entering the cavity to be discharged to the external wall.

Ventilation Of Timber Frame

Minimum 150 bove finished ground level open perpends every brick which also act as weepholes.
Approved brick ventilators e.g. wire with cement frame.

CUT & FILL FOR SLAB ON SLOPING SITE

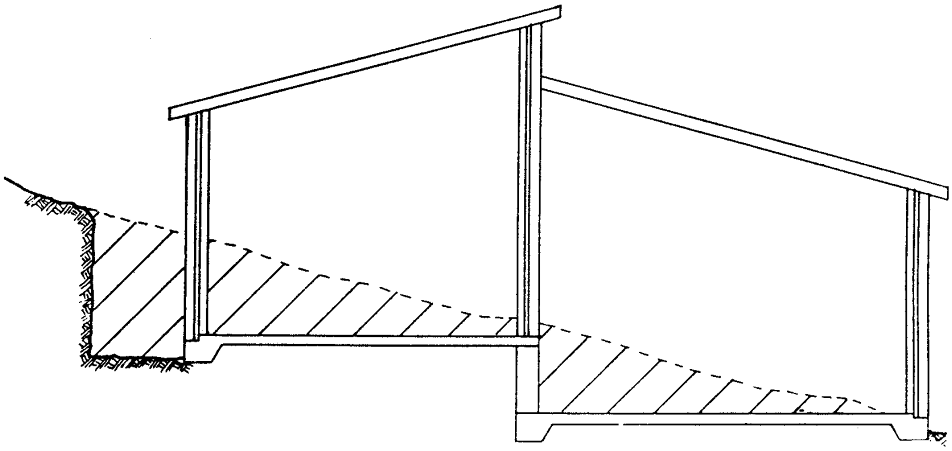
Where a concrete slab is used on a sloping site, a section of the foundation may need to be excavated. The material removed may be spread to form a level surface. This is termed **"cut and fill".**



The soil that is spread over the building area should be compacted before the slab is poured to prevent settlement under the slab in the filled area.

A wall may be needed to retain the soil around the building and drainage should be provided to allow moisture to be removed from around the slab.

An alternative method is to build the house on two levels. This can reduce the amount of filling required.



STRIP FOOTINGS

Strip footings are rectangular in section and are reinforced with a top and bottom layer of reinforcing steel. They support the external masonry veneer wall, the structural framing including the floor framing and roof framing and any other masonry walling incorporated in a building

CLASSIFICATION

Under AS 2870 - 1996 strip and slab footings are specified according to the site and type of construction.

Site Classifications

CLASS A - SAND AND ROCK WITH LITTLE OR NO GROUND MOVEMENT REALTED TO MOISTURE CHANGES.
CLASS S - SLIGHTLY REACTIVE CLAY (SLIGHT MOVEMENT RELATED TO MOISTURE CHANGES).
CLASS M - MODERATELY REACTIVE CLAY OR SILT SITES.
CLASS H - HIGHLY REACTIVE CLAY SITES.
CLASS E - EXTREMELY REACTIVE SITES.
CLASS P- SITES WITH SOFT SOIL, LANDSLIP, MINE SUBSIDENCE, COLAPSING SOILS, SOILS SUBJECT TO EROSION, REACTIVE SITES WITH ABNORMAL SOIL CONDITIONS. THESE SITES ARE OFTEN MAN MADE OR FILLED.

Strip Footing

STRIP FOOTINGS FOR MASONRY VENEER CONSTRUCTION			
Site Class	**Depth of Concrete D**	**Width of Concrete B**	**Top and Bottom Reo.**
A	300	300	3-8TM
S	400	300	3-8TM
M	500	300	3-12TM

Pad Footing

PAD FOOTINGS FOR MASONRY VENEER CONSTRUCTION From Acceptable Standards of Domestic Construction p.16 1994			
Site Class	**Depth of Concrete**	**Width of Concrete one-story *Two Storey**	**Founding Depth**
A	200	400 x 400	400
S	200	400 x 400	500
M	200	400 x 400	500

GENERAL

REQUIREMENTS FOR SLAB ON GROUND AND STRIP FOOTINGS AS 2870 -1996

Concrete

Minimum strength 20 MPA
Aggregate 20mm nominal size
Not less than 80mm slump

Lapping Of Reinforce

Bars - 25 x diameter but not less than 500mm
Trench mesh - 500mm or full width at junctions and corners
Mesh - the 2 outermost crosswires of one sheet should overlap
The two outermost wires of the other

Cover Of Reinforcement

SLAB ON GROUND:
40mm to unprotected ground
40mm to External exposed edge
30mm to a membrane in contact with the ground
20mm for the internal surfaces

STRIP FOOTINGS:
40mm minimum design cover (This may require allowing 50mm or greater to achieve this minimum amount)

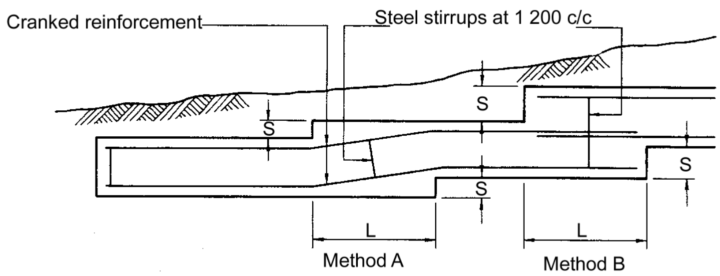
Stepping Of Strip Footings

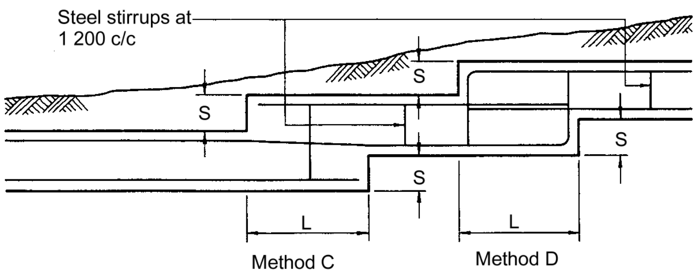
Base of footing must have a slope of not more than 1:10. Width of step must be a minimum of 1.5 x depth of footing. Steps must be in accordance with details below:

Acceptable Methods For Stepping Strip Footings

Compaction & Curing

In accordance with good trade practice all concrete should be protected against premature drying by curing all concrete for slab on ground and strip footings must be compacted during placement.



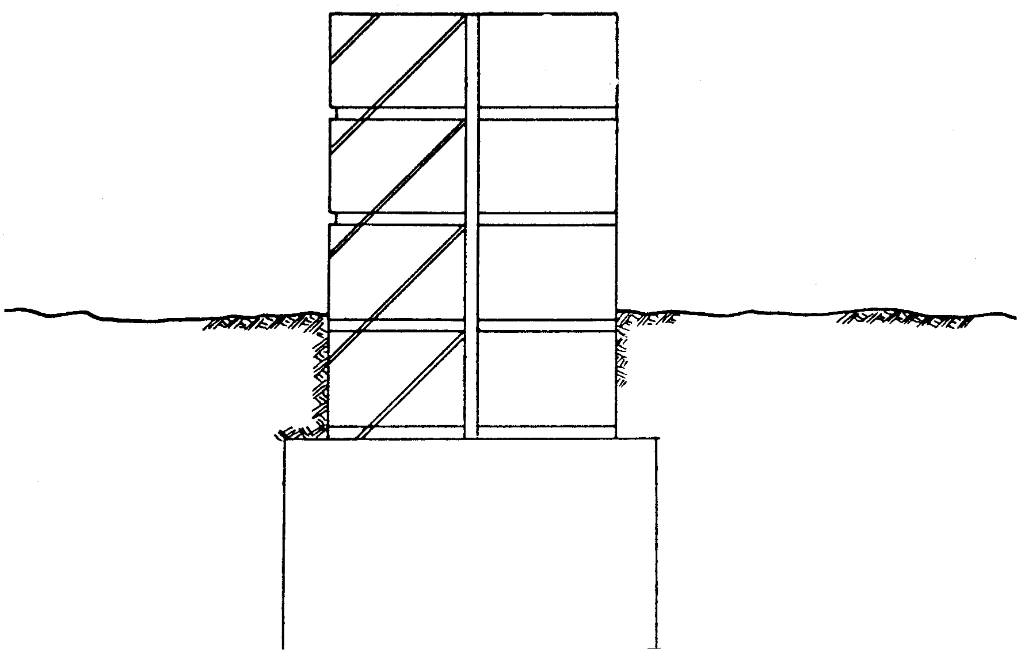


SUB-FLOOR

SUB-FLOOR WALLING

Duo floor walls for Masonry Veneer Construction are used to support a suspended floor above the ground and may be constructed as:

* Single leaf masonry with engaged piers eg. 110mm brick walls with 120 x 230 engaged piers
* 230mm brick walls - to stabilise high walls
* 270mm cavity walls - used in two storey brick veneer con struction or to provide a dry sub - floor area e.g. basement.



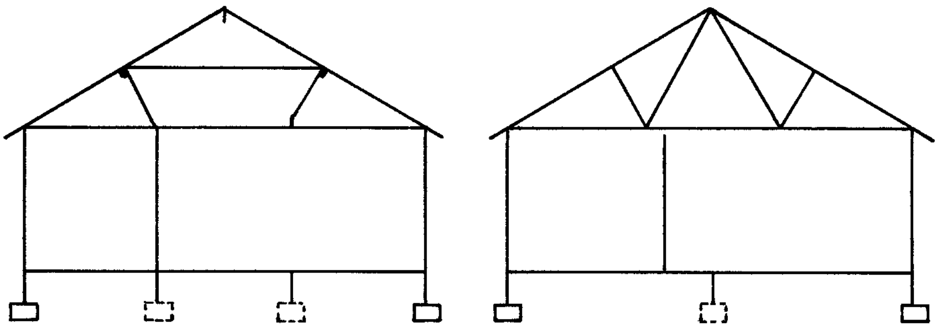
Position Of Wall On Footing

Sub floor walls are normally located centrally on the strip footing.

SPACING OF PIERS

The spacing of the attached piers will depend on the roof structure. When a trussed roof is used the mass of the roof is carried by the external walls only and attached piers should be spaced closer than for conventional roof construction. Internal walls are non load bearing and the piers can be spaced to suit maximum centres and need not be under the internal wall. If a conventional roof is used some of the load is carried onto the internal walls and piers should be built under all load bearing walls.

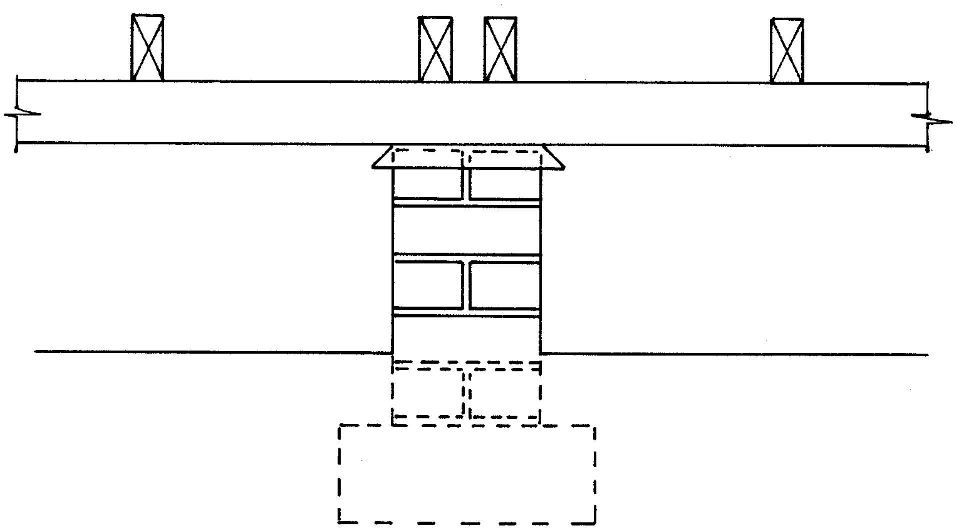
Trussed And Conventional Roof Load Distribution



Piers

Supporting Standard Bearers & Joists

100 x 75 bearers are used to span between the walls and isolated piers, 230 x 230. Joists are skewnailed to the bearer. This timber is not seasoned and will be subject to shrinkage.



DPC

Place below the lowest floor timber (Bearer Height).

Must be placed 2-3 courses above the finished ground level in areas subject to rising salt damp to prevent salt in solution rising from the ground through the wall.

DPC is lapped by a minimum of 150mm and bonded with a neutral cure silicone or bitumen.

Must be wide enough to cover the full surface of the masonry unit and finish flush with the wall face.

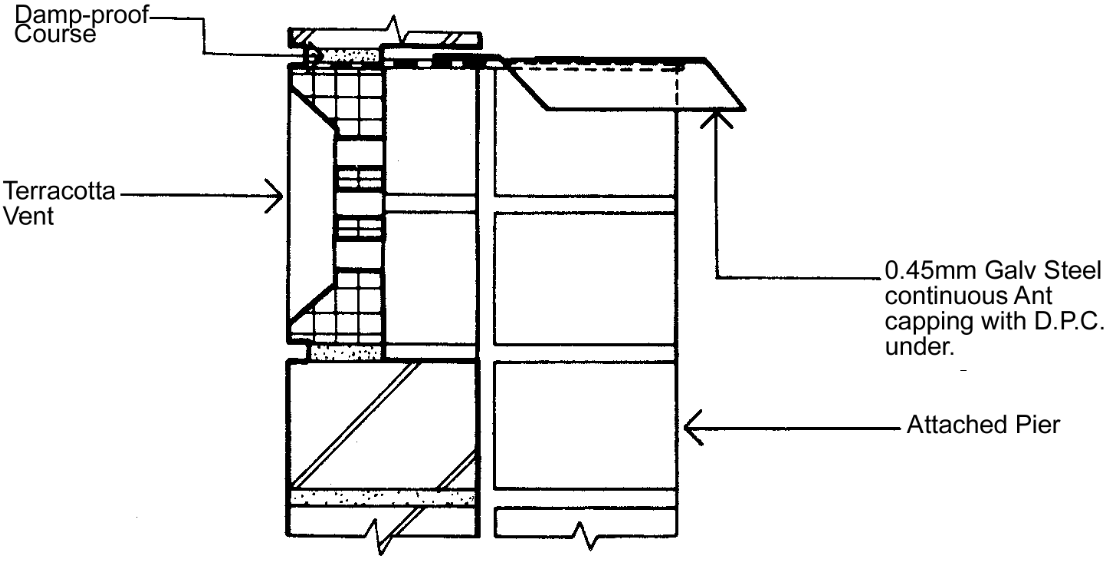
SUB FLOOR VENTILATION

Minimum ventilation for sub-floor areas which may be subjected to termite infestation is 7300 mm 2 per lineal metre of external or internal sub-floor walling.

Types of Ventilators:
Square hole terra-cotta vents
Mesh covered cement framed vents
Brick vents
Pressed metal vents.

Ventilation must be placed:
Below the DPC
Above the level of possible surface water entry.
As near to the floor frame as possible.

Air will also ventilate the cavity and prevent wet rot damage.

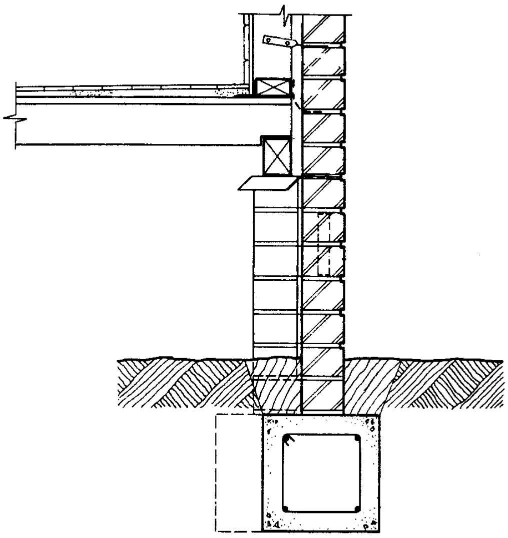


WET AREA WALLS AND FLOORS

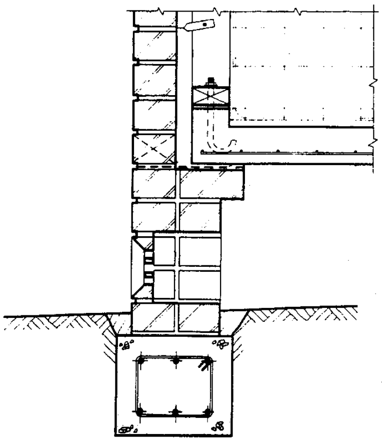
Floors may be:

Reinforced concrete supported by sub-floor masonry walls. Fibre cement, structural ply, water resistant particle board or water resistant medium density fibre board sheeting supported by floor framing on isolated piers. Wet area walls can be constructed in masonry.

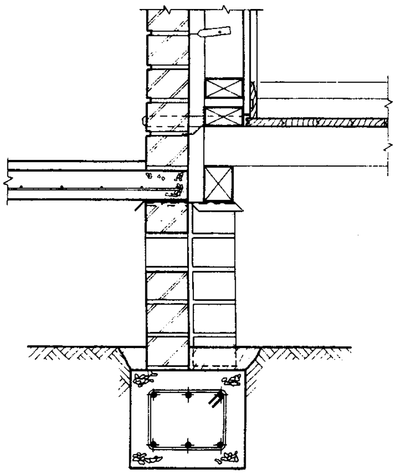
Alternative Methods For Wet Area Walls & Floors



Compressed Fibrous Cement Sheet Flooring



Suspended reinforced concrete slab
in brick-veneer construction



Junction between Internal
and External Floors

TERMITE PROTECTION

AS 3660. 1 - 1995
Australian Standard.
Protection of buildings from subterranean termites.

In NSW the Building Services Corporation under the Department of Fair Trading expects " whole of house protection". This means that all non-structural elements such as window frames, skirting boards, cupboards and furniture as well as structural members must be protected.

PHYSICAL BARRIERS

Termite barriers are built into the masonry as the building is constructed by the bricklayer / mason and include:
Antcapping - e.g. galvanised steel or stainless steel sheet.
Stainless steel mesh - "Termites"
Crushed granite -"Granitguard"

STAINLESS STEEL MESH OR ANTCAPPING FOR SUB-FLOOR MASONRY

The antcap or stainless steel mesh is built into the wall with the sloping edge to the inside of the building and the outside edge finishing flush with the masonry veneer wall.

The external edge of the antcapping must be visible in the bed joint.

All joins in ant-capping must be either:
Lock seam jointed;
Welted and soldered;
Pop riveted and soldered;
Or butt-jointed and welded for the full length of the joint.

DPC, ANTCAP & STAINLESS STEEL MESH

Antcap is lead over the DPC
Continuous antcap or stainless steel mesh is used on external masonry veneer walls and internal sub-floor walls.
All engaged and isolated piers must have either an antcap or stainless steel mesh barrier.

STAINLESS STEEL MESH FOR SLAB- ON -GROUND CONSTRUCTION

Stainless steel mesh is fixed to the concrete slab and built into the external masonry veneer wall.

The external masonry veneer wall must be fully covered by the stainless steel mesh.

A minimum finish height of 75mm above finished ground or pavement level is required.

CRUSHED GRANITE FOR SLAB- ON -GROUND CONSTRUCTION

Crushed granite is placed around the slab perimeter or in the slab rebate behind the masonry veneer and below the flashing. A minimum finish height of 75mm above finished ground or pavement level is required.

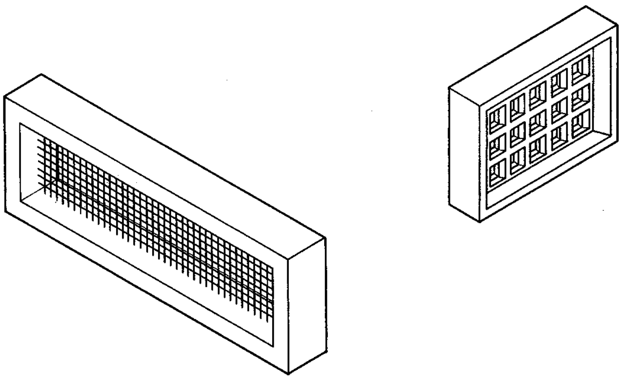
VENTILATION

Minimum sub-floor ventilation in potential termite areas is 7 300mm2 per lineal metre of external and internal waling.

A single course of 10mm open perpends will not meet this requirement.

Bearers, joists or bottom plates shall be no closer than 25mm to the external masonry veneer wall.

A ventilator should be placed at no more than 600 from any corner.



GROUND CLEARANCE FOR SUB-FLOOR ACCESS

Minimum clearance between any floor framing or other obstructions and ground level is 400mm.

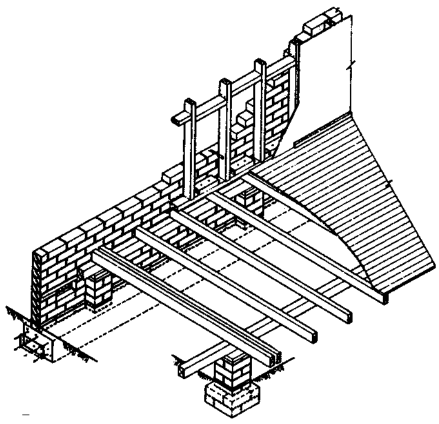
On sloping sites this can be reduced to 150mm.

The purpose of this requirement is to allow access to the sub-floor area so that it can be easily inspected for termites, as well as improving sub-floor ventilation. This height is determined by the mason / bricklayer who establishes bearer height when setting out the sub-floor masonry.

FLOORING

FLOOR FRAMING TIMBER FLOOR

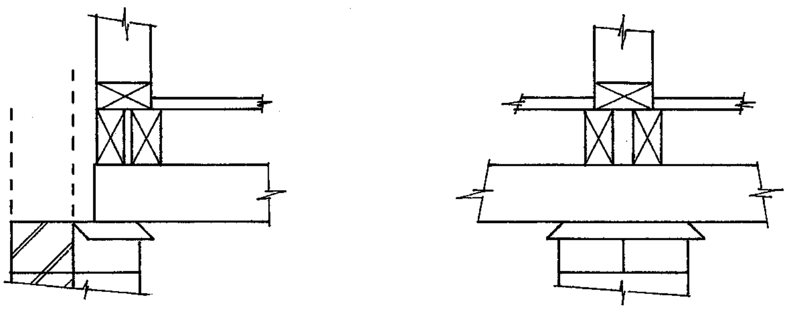
Isometric view of floor framing and flooring



FLOORING - TONGUE AND GROOVE

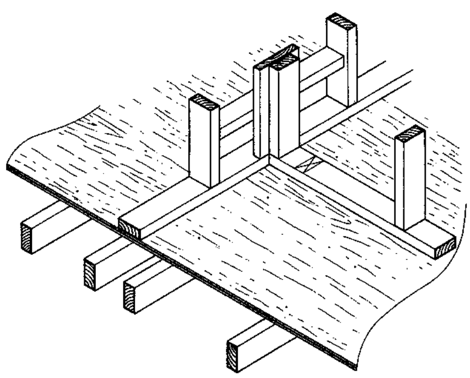
Strips of flooring 75 to 100 wide by 19 thick may be laid over the joist after the frames are erected. This will require double joists under some walls to provide a support for the flooring and wall plate. The flooring may swell if cramped and nailed if exposed to the weather, so it may not be laid until the brickwork is finished and the roof is covered.

Double Joists Supporting Flooring



SHEET FLOORING

Sheets of particle board with plastic tongues and grooves may be used as flooring. This material may be laid over the joists before the frames are erected. This will save the double joists and provide a working platform to set out the frames

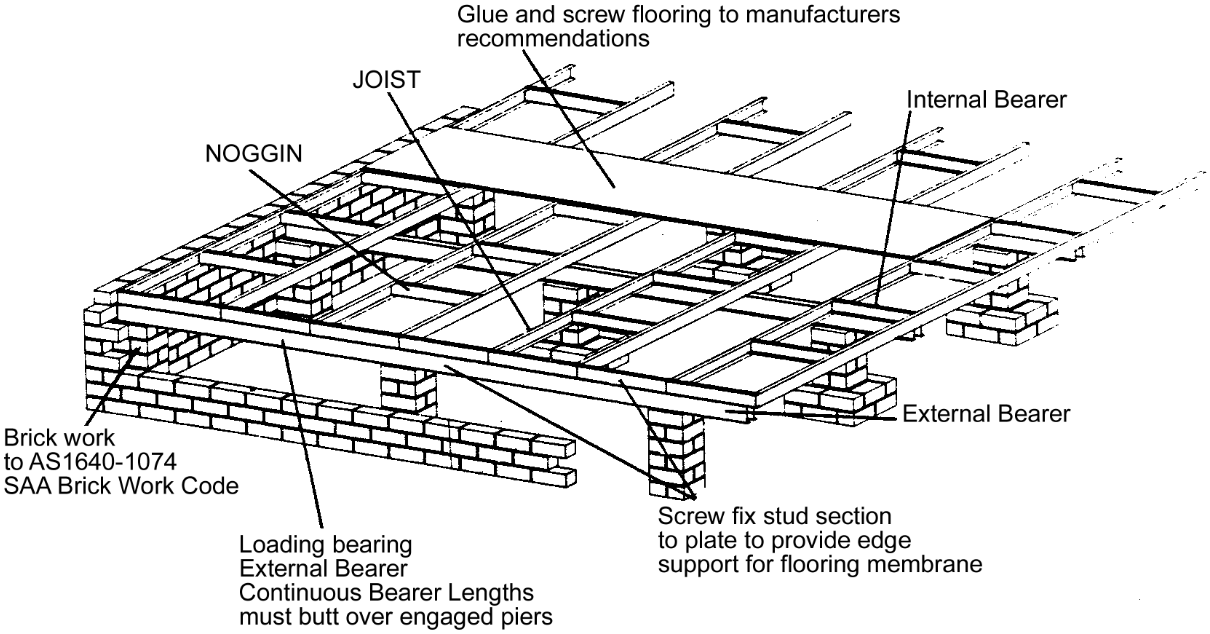


STEEL FLOOR FRAMING

Steel floor members are available from steel manufacturers. The difference between steel and timber framing is:

(a) Top of bearers and joists are at same height
(b) Steel will span greater distances
(c) No shrinkage of bearers and joists
(d) Self drilling and self tapping screws or rivets or nuts and bolts are used to install the steel members

Steel Floor Framing Components



WALL FRAMING

Wall frame sections are positioned on top of joists or on sheet flooring.

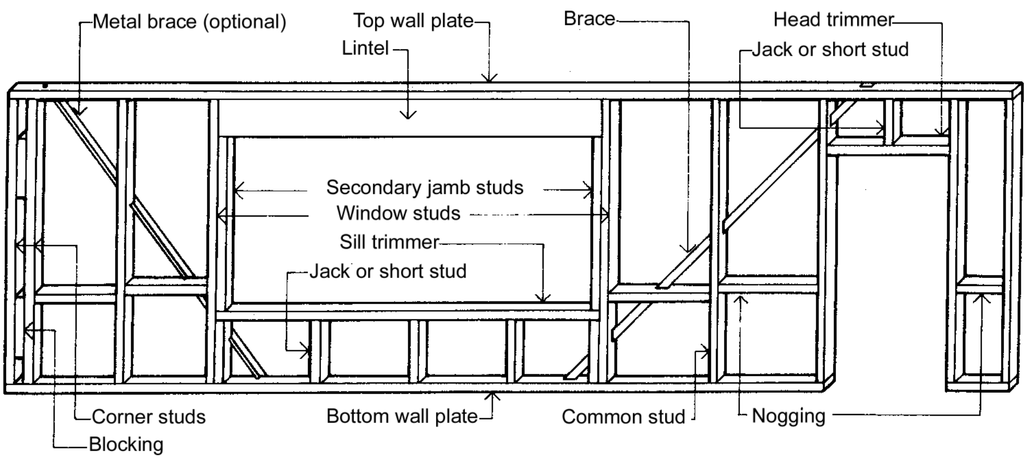
TIMBER WALL FRAMES

The frame can consist of:

(a)	Top plate	(e)	Nogging
(b)	Diagonal Brace	(f)	Sill Trimmer
(c)	Stud	(g)	Lintel (Head)
(d)	Bottom Plate	(h)	Jack Stud

Wall framing can be constructed on site or at a factory and delivered as a pre-fabricated unit.

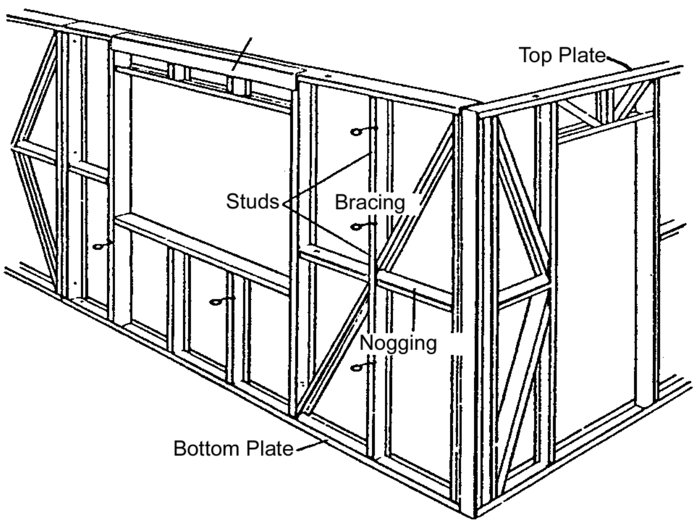
Timber Frame Showing Members



STEEL WALL FRAMING

Steel frames may be used for wall framing. These frames are prefabricated from information on the plans, assembled in the factory and brought to the site ready for erection. Section used may vary from manufacturer to manufacturer.

Steel/ Wall Frame Components

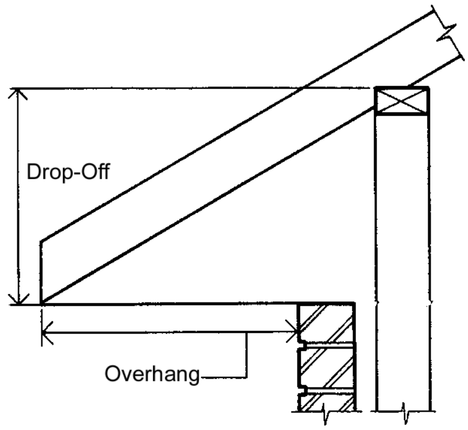


EXTERNAL MASONRY WALL

EAVES & DROP OFF

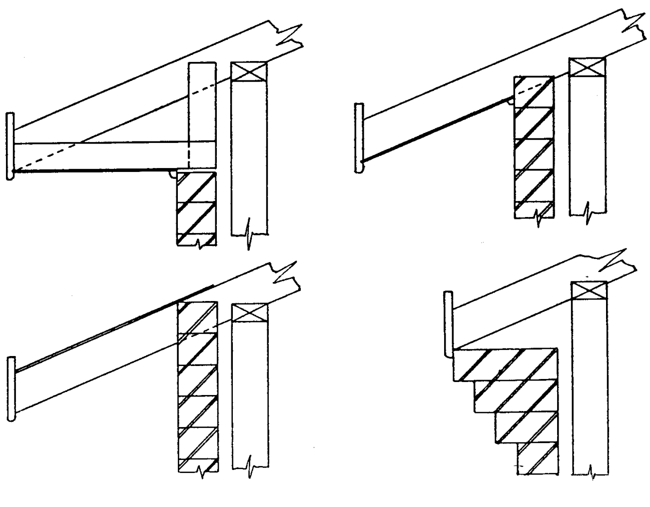
Before the masonry above the sub floor walling can be commenced, the finished height of the wall must be established. The masonry will normally finish lower than the top plate to allow for the eaves. **The vertical difference between the top of the masonry and the top of the top plate is called the <u>drop off.</u>** This distance will vary with the pitch of the roof and the width of the eave.

Drop Off



The projection of the roof over the masonry is called the eaves. The type of finish used will vary from building to building.

Types of Eaves



CAVITY WIDTH

The cavity formed between the masonry wall and timber frame must be a **minimum of 25 and a maximum of 50.** The cavity width can be adjusted by using a string course.

STRING COURSES

A projecting course of bricks around a building to:

(a) To allow an increase or decrease in cavity size.
(b) Form a decorative feature
(c) Conceal edge of termite barrier & DPC
(d) Conceal variations in bricks - colour and size

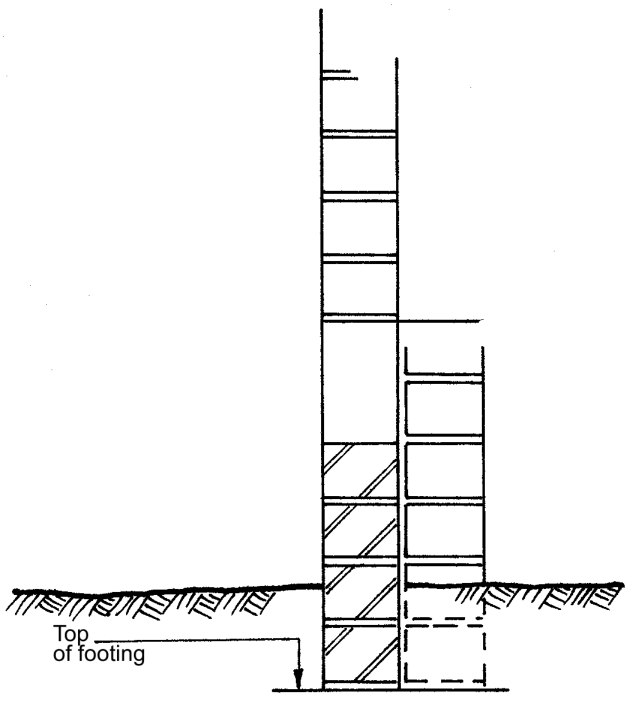
VERMIN WIRE

Prevent rats or other animals from entering the cavity and building nests. It is a continuous layer of galvanised wire mesh built into the masonry and fixed to the bottom plate.

13mm galvanized mesh is fixed to bottom plate with **galvanised clouts or staples at 150 centres** and bedded into the external skin of the masonry.This wire must be lapped and folded at joins and corners. Mortar must be prevented from hardening on the wire and bridging the cavity because it will:

(a) Allow water to cross the cavity
(b) Reduce air flow causing loss of ventilation

This can be prevented by:
(a) Neat, clean workmanship
(b) Placing paper in cavity and removing later
(c) Hosing out cavity daily

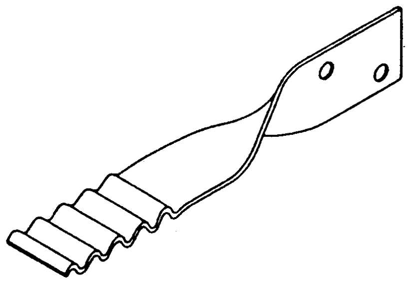


1. Termite barrier
2. Attached pier 230 x 220
3. Bearer 100 x 75 at 1800 cntrs
4. Bottom plate 100 x 50
5. Brick wall
6. DPC
7. Flooring
8. Footing
9. Joist 100 x 50 at 450 centres
10. Steel reinforcement
11. String course
12. Ventilation

VENEER TIES

The external wall is tied to the timber frame by galvanised veneer ties to increase it's stability. The tie is often designed with a twist or bend to prevent water reaching the frame. It should be bedded into the brickwork so that the "drip" is in the centre of the cavity. Ties should be kept clean of mortar and droppings to prevent moisture crossing the cavity.

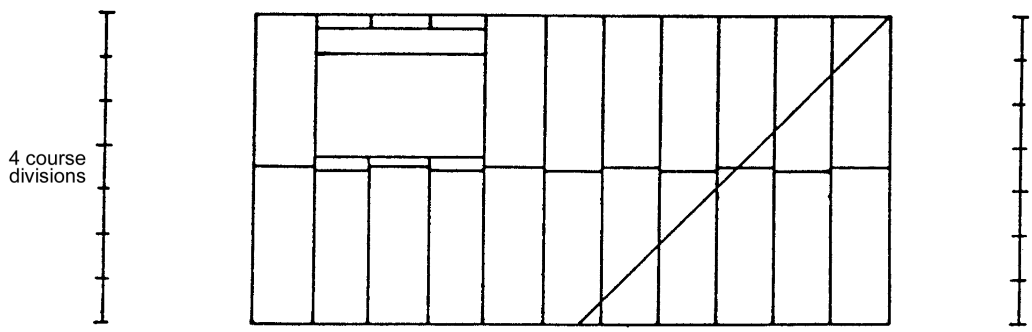
Veneer Ties



AS 3700 MASONRY CODE TIE SPACING

Wall frame
Maximum 600 x 600 centres for studs at 600 centres.
Maximum 600 x 450 centres for studs at 450 centres.

Around Openings and Control Joings
Maximum Spacing is 300 and ties must be within 300 of the control joint or opening.



Often ties are fixed to the frame after the masonry is laid, but there are situations where the mason / bricklayer will have to fix the tie to the frame <u>as it is laid</u> e.g. steel framing, narrow piers or panels, two storey masonry veneer walls

The ties should slope up to the frame when fixed because it will:

(a) **Help prevent moisture travelling across the cavity**
(b) **Allow for frame shrinkage - ties must always slope up after the frame shrinks.**

ALLOWING FOR TIMBER SHRINKAGE

If a timber frame is used there will be shrinkage in the timber members as the sap evaporates and the timber is placed under load. **The greatest shrinkage will be in the:**

(a) Bearers
(b) Joists
(c) Bottom Plate
(d) Top Plate

Timber frames on concrete slabs will not shrink as much as frames on timber flooring because there is no floor framing.

Metal frames on concrete slabs or metal floor frames will not have any shrinkage settlement.

SHRINKAGE GAPS

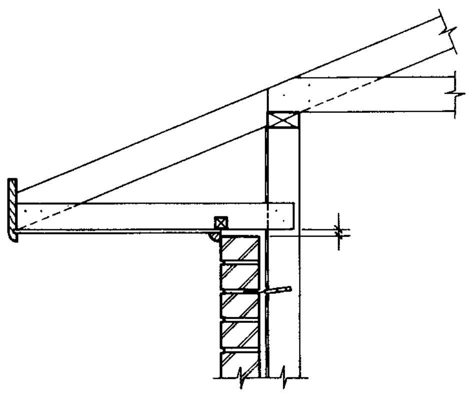
Wherever the timber frame overhangs the masonry, an allowance must be made for this shrinkage. The timber frame generally projects over the masonry at:

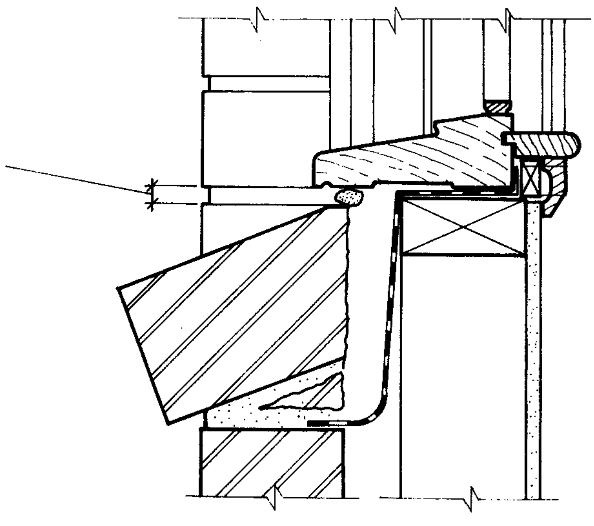
(a) Eaves
(b) Sills
(c) Door treads or thresholds
(d) Cantilevered balconies
(e) Masonry gables below roof framing

Shrinkage Gap Positions

The size of the shrinkage gap will vary depending on where it is located:

Single Storey 10mm
Double Storey 20mm (30mm for unseasoned hardwood)





BUILDING OVER OPENINGS

Openings in the masonry veneer are at times built over. Angle irons and flat bar are normally used to allow the masonry to be laid over the opening during construction.

FLAT BARS

Galvanised flat bars are used for openings up to1200mm max.
Minimum end bearing 100mm.

ANGLE IRONS

Galvanised angle irons are used for openings up to 3000mm.
Minimum end bearing:
150mm for up to 1800mm span.
230mm for up to 3000mm span.
For openings over 3000mm **an engineer's certificate or manufacturer's specification should be applied.**

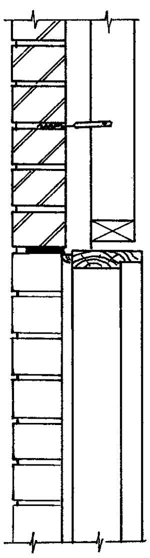
FLASHING

A flashing must be used above the opening to divert water that may reach the cavity. **The flashing is turned up at least** 150mm, nailed to the frame and taken across the cavity and built into the masonry at a lower level. **Flashing should project a minimum of** 100mm **beyond the opening at each end** and be turned up at each end to form a tray to direct water out of the weepholes in the masonry.

WEEP HOLES

Weep **holes** must be formed in perpends immediately above the

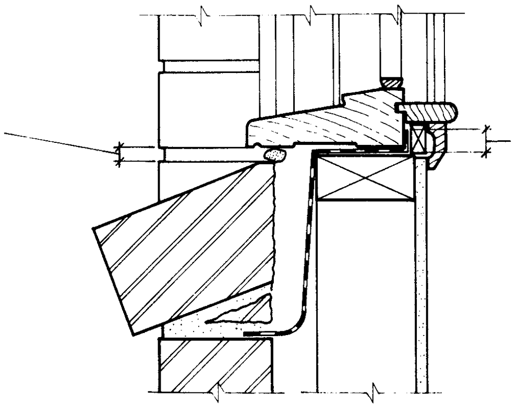
Section Through An Opening



SILL DETAILS AND USES

The purpose of the brick sill is to allow water to be removed quickly from the bottom of the frame and discharge clear of the wall.

Brick Sill To Timber Window frame



MATERIALS

Various types of materials may be used to form sills.

a) Bricks - moulded, on edge or on flat
b) Quarry Tiles
c) Glazed Concrete Masonry
d) Sandstone
e) Slate

OVERHANG

To allow the water to fall clear of the wall, **the bottom edge of the sill brick should overhang the wall.** This is termed the **overhang** and should be 20 - 40mm

ALLOWANCE FOR SHRINKAGE

A gap must be provided between the timber or metal window sill and the brick sill to allow for shrinkage.

The size of the gap will depend upon:

a) Location of window (first or second floor)
b) Type of framing used (steel, softwood, hardwood)
c) Slab on ground or suspended timber floor

Some windows are fitted with a flexible flap which will cover the gap, but timber frames may need a non hardening mastic joint between the two sills to prevent water reaching the cavity.

Single Storey 10mm

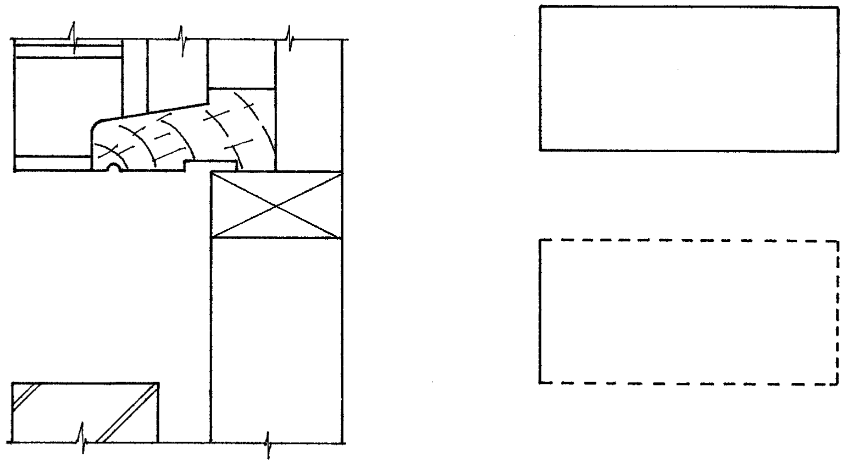
Dougle Storey 20mm (30mm For Unseasoned Hardwood)

SILL BRICK SHAPE

The size of the sill brick can be determined by measurement. Allowances must be made for:

a) Settlement allowance - 10, 20 or 30mm.
b) Overhang required.

Section Through Frame And Masonry



Measuring A Sill Brick On The Job

Measure the distance from the face of the masonry at sill height A to the underside of the window at B (Allow for shrinkage gap).

From the end of a brick measure back the overhang distance say 30mm and transfer the distance AB onto the brick.

Measure 140mm (30mm overhang + 110mm) along the bottom of the brick.

Cut the sill brick to this size and shape and hold it in position on the sill. If it is suitable, then cut the required number of sill bricks using this brick as a pattern.

CALCULATING SILLBRICKS

Allow 10 headers on flat for each metre of opening.
Allow 13 headers on edge for each metre of opening.

Allow 5 stretchers in length for each metre of opening.

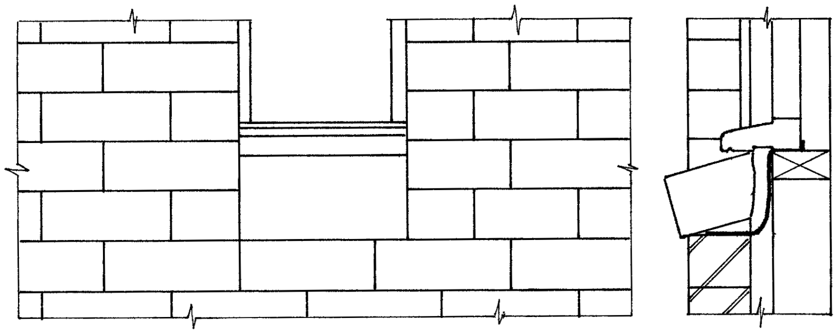
GAUGING SILL LENGTH

All joints in the sill should be equal. Joints may be adjusted to allow for the opening size.

Where the opening will not work brick sizes, cut bricks are required.

Sketch Showing Position Of Cut Bricks

A cut should be laid at each end of the sill - not one cut in the middle.



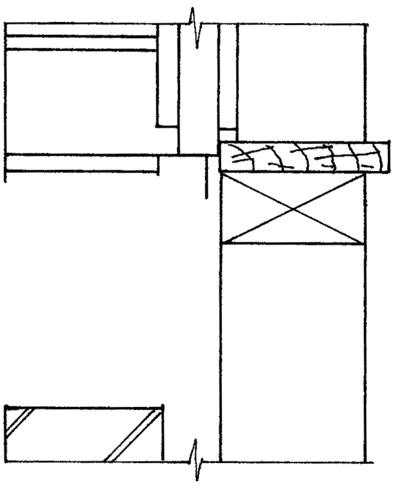
PREPARING THE SILL FOR LAYING

The sloping bed for the sill brick can be prepared by laying part of the sill bed as the wall is erected. A fresh mortar bed can be laid on this when the sill is ready to be laid.

METHOD

Place mortar on the masonry under the opening and check the slope by sliding a sill brick along the wall with one arris touching the face of the masonry and the top edge 20 -40mm below the sill. Leave the mortar with a hacked finish to prevent the sill brick slipping when being laid.

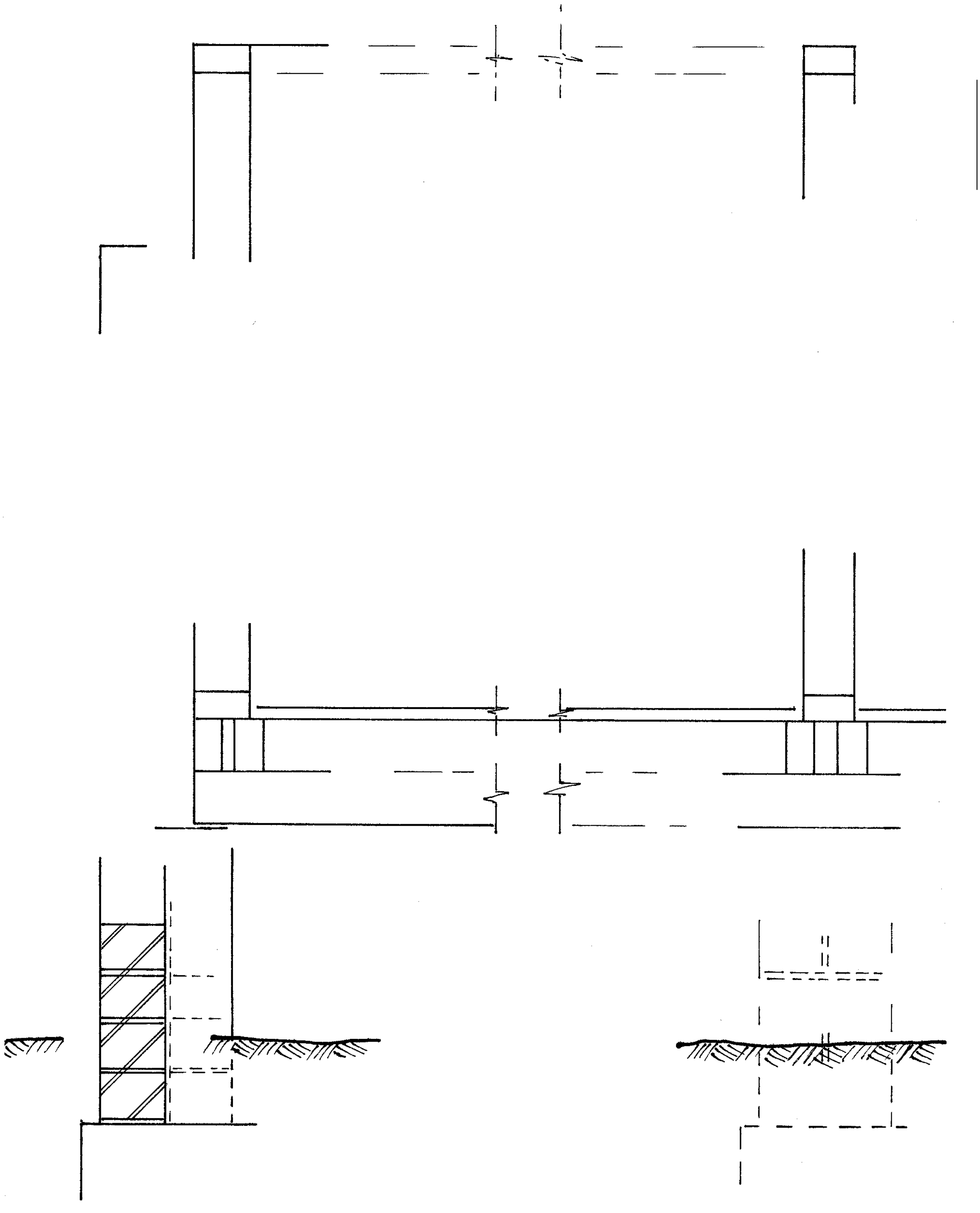
Preparing A Sill Bed



STUDENT EXERCISE

Students to complete the section through the masonry veneer cottage to show:

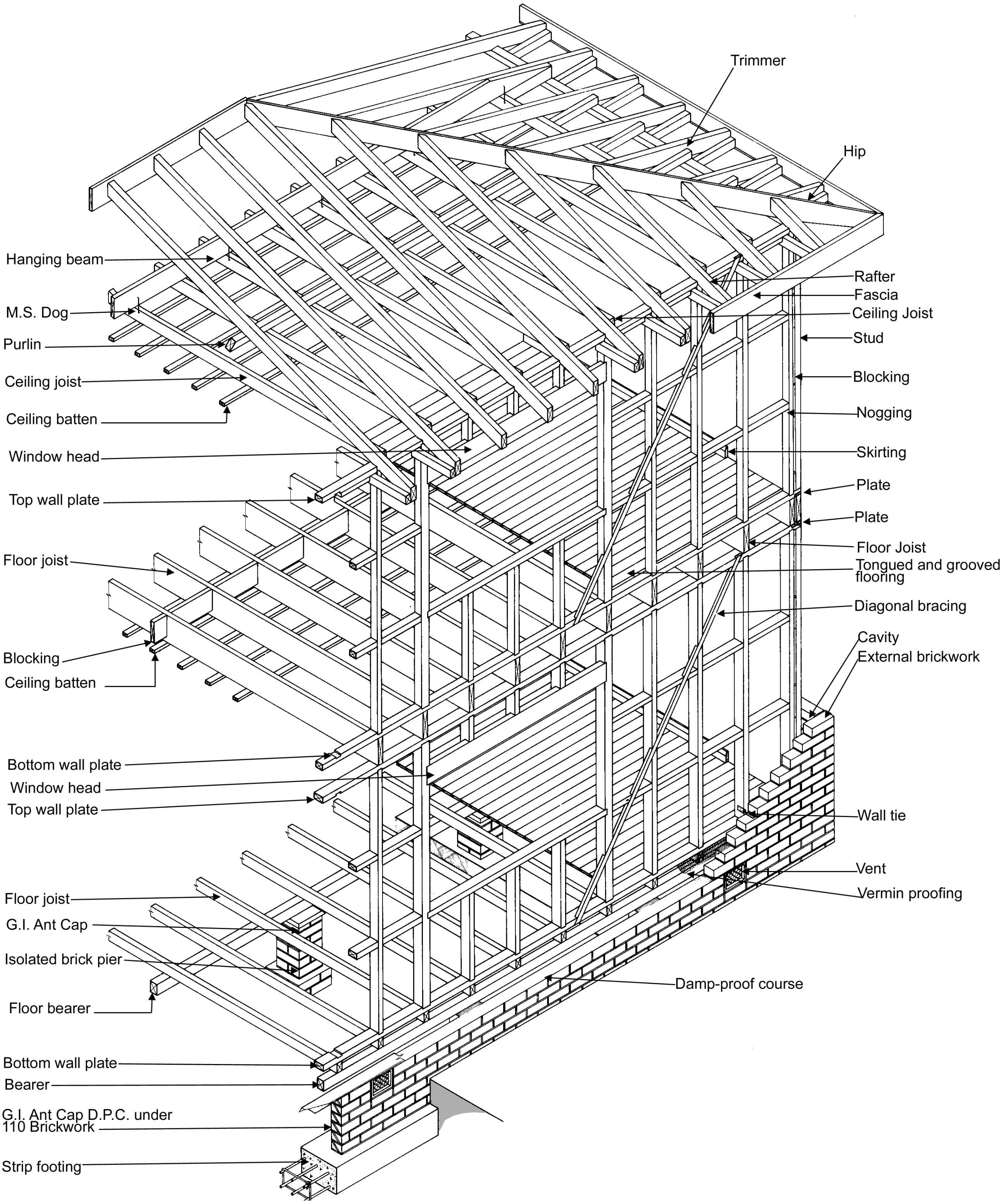
Identify and label all components from foundation to top plate. Scale 1:1 0



TWO STOREY BRICK / MASONRY VENEER

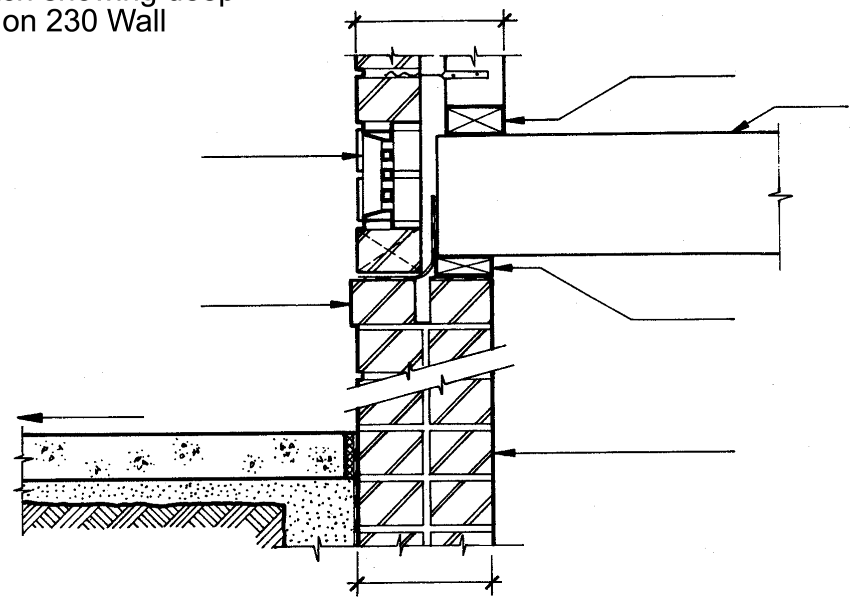
Two storey masonry veneer cottages may be full masonry veneer with timber frame or may be composite construction of full masonry for the ground floor and masonry veneer for the upperfloor.

TwoStorey Masonry Veneer Construction

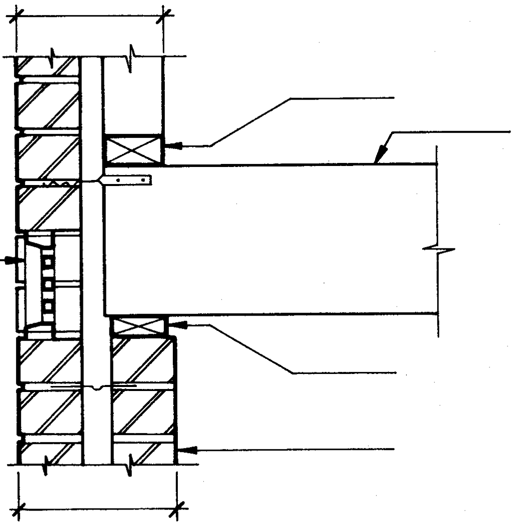


Two -story Masonry Veneer Construction

Sketch showing deep joist on 230 Wall



Sketch showing deep joist on 280 Cavity Wall



DEEP JOISTS

Uses:

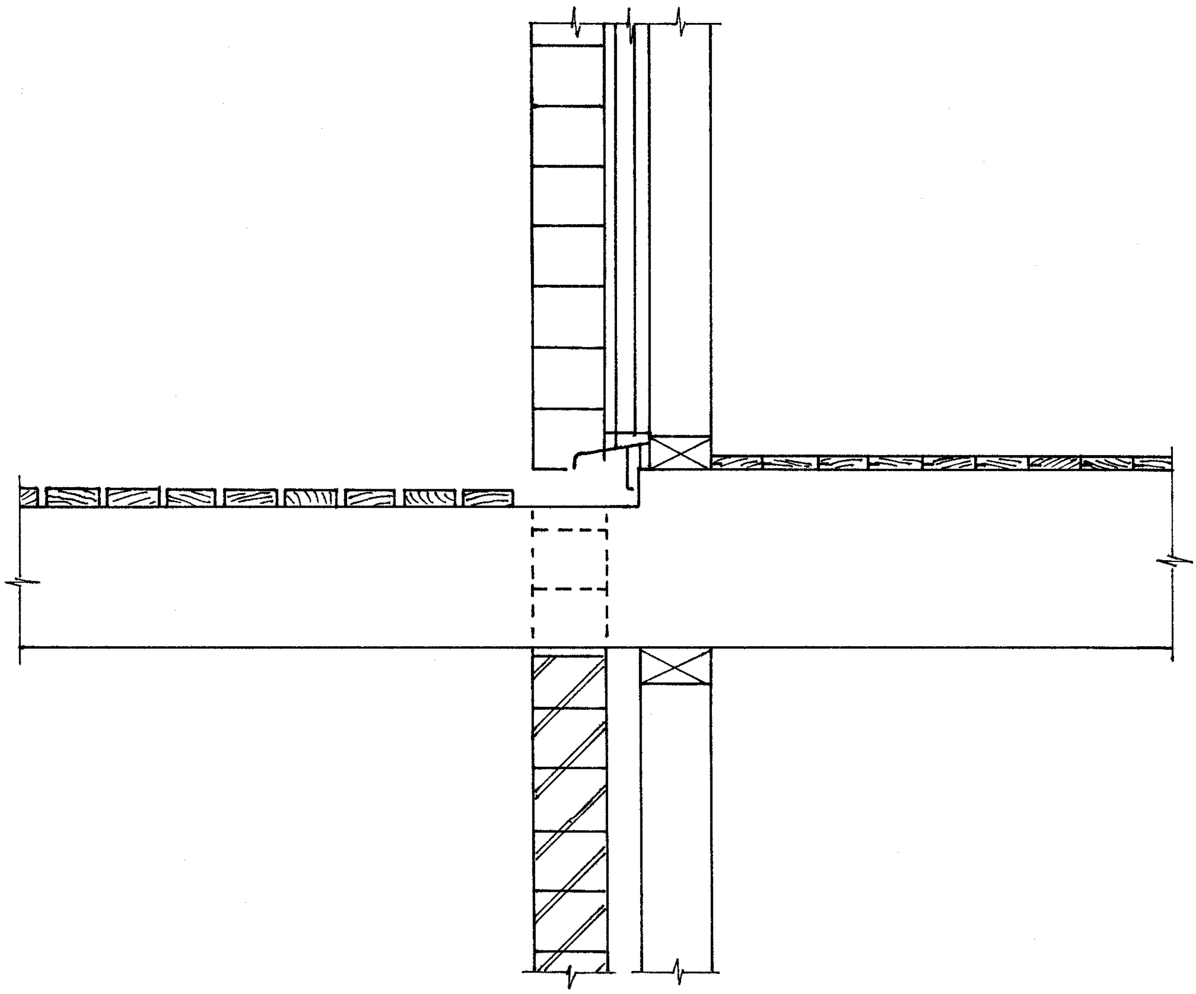
(a) Reduce piers required - allows larger pier centres

(b) Spanning areas in lower floor of 2 storey homes -garage

(c) Cantilevered balconies - allow greater overhang

Cantilevered Balconies

Drawings of use of deep joists in cantilevered balcony & other



SELF TESTING

Attempt to answer the following questions without referring to the manual. Use a pencil for easy correction.

1. Name the Australian Standard AS 2870 - 1996.

2. What is the minimum width of a step in a strip footing?

3. What is the minimum concrete cover required in a strip footing?

At a scale of 1: 10 using a pencil draw a cross section detail of a strip footing suitable for Masonry Veneer Construction on a Class M site. Provide and label all detail.

At a scale of 1: 10 using a pencil draw a cross section detail of a typical slab on ground footing suitable for Masonry Veneer Construction on a Class M site. Provide and label all detail.

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PLAN INTERPRETATION & DRAWING

This section will enable you to identify specific features from a plan and to prepare detailed drawings of masonry veneer construction.

PLAN INTERPRETATION

DRAWING

Draft a section through a masonry veneer cottage to a scale of 1: 10

Include the following information:

1. All timber frame components from bearer to top plate including cross sectional sizes sizes and spacing as required for standard timber frame construction .
2. Termite barrier
3. Damp proof courses
4. Window and sill flashing
5. Veneer ties
6. Ventilation
7. Vermin Wire
8. Minimum ground to bearer height
9. Drop - off
10. Brickwork from top of footing to drop - off.
11. Footing detail for single storey masonry veneer on a Class S site.

BRICK / MASONRY VENEER CONVERSION

This section will enable you to identify methods used to convert existing buildings to Masonry Veneer Construction.

BRICK/MASONRY VENEER CONVERSION

Timber framed buildings are often veneered with masonry for the following reasons:

a) Improved appearance
b) Improved insulation
c) Reduced Maintenance

PLANNING

Before a building can be veneered with masonry, plans must be submitted to Council because the masonry walls will be closer to the boundaries and street alignment.

Other points to be considered include:

a) Relocation of services - stormwater downpipes, drainage lines, external vent pipes, water service, meter box, external fixtures
b) Masonry to eaves finish
c) Type of foundation & footing
d) Realignment of existing building for level and alignment.
e) Masonry to reveal finish at existing windows & doors

BUILDING APPLICATION TO BE SUBMITTED TO COUNCIL

Three copies of the plans & specifications are required by Council:
1. Council File 2. Inspector 3. Owner

Should include:
a) Floor plan & elevations
b) Section detail
c) Site plan
d) Specifications
e) Engineers detail & certificate if required

FOOTINGS

New footings must be provided to support the masonry walls. These footings do not have to tie into the existing footings.

Local Councils may nominate the size of the footing re-quired depending on the soil type in the area.

In some cases it may be necessary to remove all existing masonry and place new footings. This will require temporary supports being placed under the bearers where they are supported by engaged or isolated piers

LEVELS

The building to be veneered may have settled and no longer be level and plumb. To ensure that the last course fits against the eaves without cutting it may be necessary to realign the building. This can be done by using 5 tonne hydraulic jacks to re-level the building and placing temporary supports adjacent to existing isolated and attached piers.

Where extensions to the existing building involve adding another storey or excavation for a garage, the existing footings may have to be underpinned. This underpinning may be continuous around the building or at given points where an increased load is transmitted to the wall. Underpinning techniques will be covered in Stage 3 of the Bricklaying Trade Course.

Underpinning

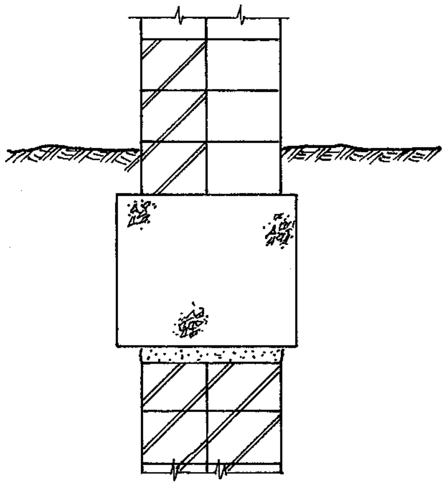
SET OUT OF WALLS

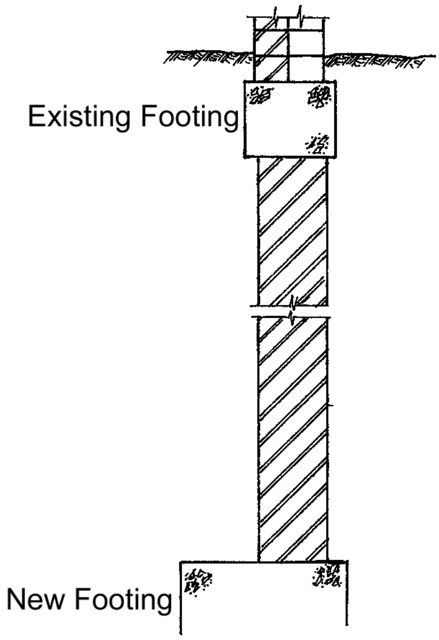
Because the building may have settled, the existing timber walls may not be plumb or in alignment.

All existing walls should be checked and new masonry should be set out to allow for the minimum sized cavity at those points where the existing building is "hard".

CLADDING

If the existing cladding is in good condition it should remain on the wall. This must be also be allowed for when calculating the cavity size. String courses may also be used to adjust the cavity width.





Finding Points

Starting

WALLS

Masonry walls with a 25 - 40mm cavity between new and existing walls can now be built.

Cleaning eyes should be left at regular intervals to allow the cavity to be washed out.

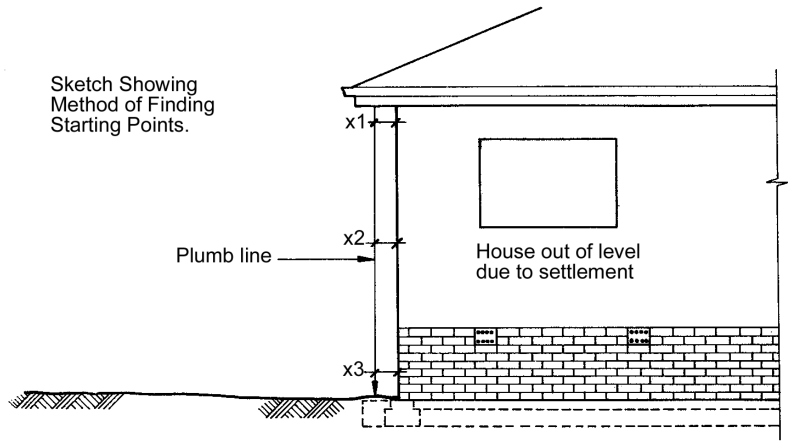
Any existing external masonry wall should be attached to the new masonry veneer with ties at standard spacings e.g. "Ramset", "Dynabolt", "Abey" or other types of masonry wall ties at 600 x 600 centres.

VENTILATION

New vents opposite original vents where possible.
Minimum ventilation required is 7300mm2 per lineal metre of external walling.

DPC

Two courses above ground and at bearer height.



TERMITE BARRIER

Install an approved termite barrier across the full width of the new external masonry and to all attached piers.

ACCESS DOOR

Provide an opening at least 600 wide for access to the sub -floor area.

EXISTING CLADDING

If the existing cladding is in sound condition, it may be left in place as additional insulation. If timber weatherboards are left on, adequate insulation must be provided to prevent dampness causing rotting.

TIES

If the cladding is left on, face fixed ties must be used to tie the walls together as the work proceeds.

If the cladding is removed side fixed veneer ties must be used to tie the walls together as the work proceeds.

VERMIN WIRE

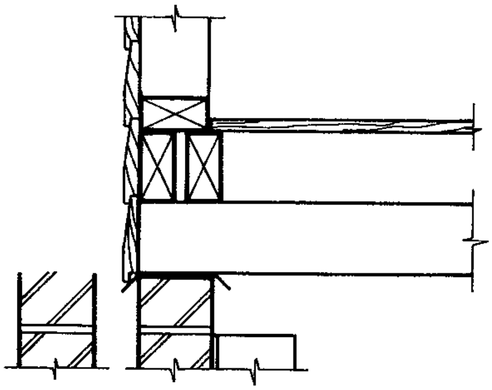
Vermin wire should be nailed to the frame at the plate level. The wire needs to be hosed out at regular intervals to wash away any mortar droppings before they harden. The wire cannot be reached after the wall is commenced.

Vermin Wire

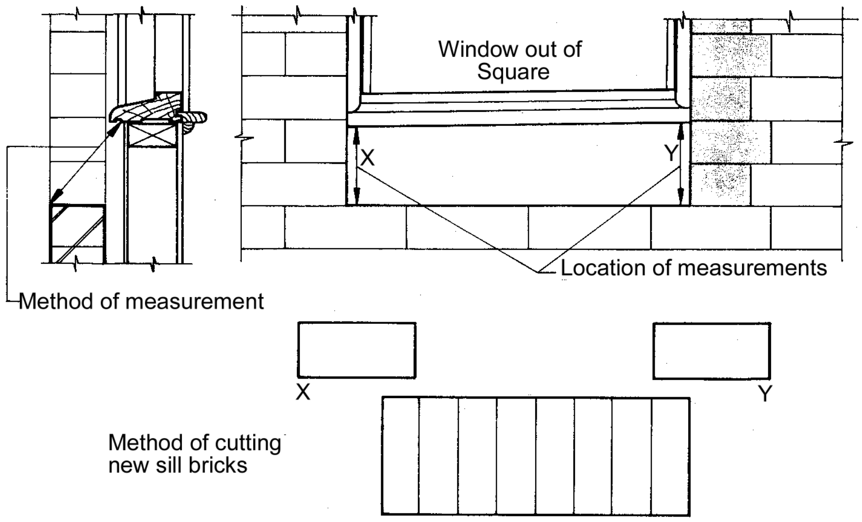
WINDOWS

Timber windows are often replaced with aluminium windows when the house is converted to masonry veneer. The new windows are set out to allow for the cavity and should be level and plumb. Existing windows will require new storm moulds to span the cavity and provide weather protection to the internal wall. These windows may not be level or plumb, and this must be allowed for when cutting the sill bricks.

Laying a Sill to An Existing Window



CARPENTRY RELATED PROBLEMS AND THEIR SOLUTIONS



CALCULATIONS

This section will enable you to estimate the true length of walls and the numbers of bricks in brick sills and attached & isolated piers

BRICK SILLS

Brick sills can be a feature of cottage work and the quality of the material and the workmanship can improve or spoil the complete appearance of the face brickwork.

The selection of bricks for the sills is important and should not be left to the end of the project, when most of the better

TYPES

Brick sills can be classified as either:

a) Brick On Edge (76mm face exposed). OR
b) Brick On Flat (110mm face exposed)

Brick on edge sills may be rectangular bullnose or squints. The number required per metre will be the same.

NUMBER OF BRICKS PER METRE

To establish the number of bricks per metro: divide one metre by the width of the exposed face plus one joint.

BRICK ON EDGE

1 000mm, (76 + 10) 86 = _______________ bricks

To allow for wastage _______________ bricks are allowed for each metre of sill.

EXERCISE 1

A small lock up shop has windows of the following lengths: 1800; 1200; 2400; 600; 686.

Calculate the number of bricks METHOD required to construct the sills using brick on edge formation.

METHOD

1 Calculate total length of windows:

2 Multiply length by _________________________ round up to bricks _______________.

EXERCISE 2

A cottage has windows of the following lengths:
1 @ 2400; 2 @ 1800; 6 @ 1500 and 1 @ 700.

Calculate the total number of bricks required to construct the sills using brick on edge formation.

METHOD

1 Calculate total length of windows:

2 Multiply length by ____________________

round up to bricks _________________.

BRICK ON FLAT SILL

1000mm ÷ (110 + 10) 120 = ____________ bricks.
To allow for wastage ______________ bricks are allowed for each metre of sill.

EXERCISE 3

Using the problem described in Exercise 2, calculate the number of bricks that would be required to construct the sills brick on flat.

Window lengths

Number of bricks = _______________

EXERCISE 4

Calculate the bricks required for brick on flat sills for a cottage with the following window lengths:

2@1.8;4@1.2;2@0.9; 1 @0.6.

EXERCISE 1

Calculate the number of sill bricks required for a car showroom having 4 windows 3.6 long. These sills will be brick on edge.

EXERCISE 2

Calculate the number of bricks required to construct the sills of a cottage with windows of the following lengths: 1 x 2400; 3 x 1800; 4 x 1200; 2 x 600. These sills will be brick on flat formation.

EXERCISE 3

Calculate the number of bricks required to construct the sills in Exercise 1 using brick on flat formation.

ISOLATED PIERS

To calculate the approximate number of courses required for isolated piers:

Divide the total height of the pier by the height of the brick course.

EXAMPLE

Pier height 1000mm 1000 / 86 = 11.628 courses **- Say 12 courses**

EXERCISES

1. Calculate the number of courses in the piers shown.

To obtain the number of bricks required multiply the number of courses by the number of bricks in each course.

Number of courses = Height / 86mm rounded up to next figure.

ATTACHED PIERS

Attached piers can be calculated the in the same way as isolated piers and collected together where there are a number of attached piers the same size

EXAMPLE

Height = 1100 ÷ 86 = 12.79 say 13 courses

Number of bricks in course = 2

INDIVIDUAL PIERS

13 courses x 2 bricks = 26 bricks

(a)	700 =	9 courses	x	2 (230 x 230 pier = 2 bricks per course) Bricks in pier = 18
(b)	1380 =	courses	x	(350 x 350 pier = bricks per course) Bricks in pier =
(c)	1700 =	courses	x	(470 x 470 pier = bricks per course) Bricks in pier =
(d)	400 =	courses	x	(230 x 350 pier = bricks per course) Bricks in pier =
(e)	2700 =	courses	x	(230 x 600 pier = bricks per course) Bricks in pier =

EXAMPLE

Height 2700 - 86 = 31.395 courses say 32 courses

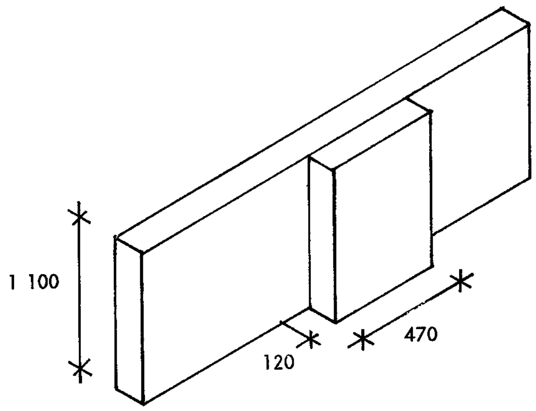
Number of bricks per course = 5

PIERS IN A WALL

32 courses x 5 bricks x 8 piers = 1280 bricks

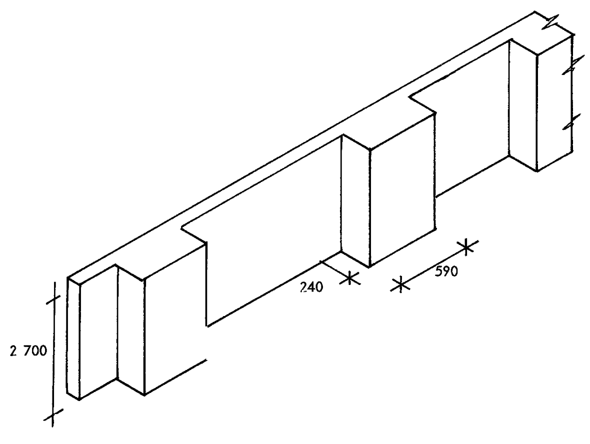
EXERCISE:

Calculate the number of bricks required for the following attached piers:



a) Wall height = 3000
Pier size = 240 x 710
Number of piers = 2

b) Wall height = 1550
Pier size = 120 x 470
Number of piers = 7



c) Wall height = 3600
Pier size = 350 x 950
Number of piers = 12

CENTRELINE MEASUREMENT OR TRUE LENGTH

Centreline measurement or true length is an accurate method of measurement which is most suitable for estimating the quantities of masonry in large scale projects such as townhouses, home units, factories and office buildings.

It is also useful in estimating concrete quantities in strip footings.

The true length of a wall is it's centreline measurement not the perimeter length.

EXAMPLE

The the two flower boxes have exactly the same true length but not the same perimeter length.

True Length = 25 Bricks
Perimeter Length = 30 Bricks

Calculating True Length

True Length = Perimeter Length minus 4x wall thickness.
=35 Bricks minus 4x1/2 brick wall thickness
=35-4x1/2
=35-2 =33
True length = 33 Bricks

True Length = 25 Bricks
Perimeter Length = 35 Bricks