DETAILING OF CONCRETE MASONRY

Volume 3 – Cavity Walls 240 to 290

Concrete masonry: Strong, durable and attractive

CONCRETE MANUFACTURERS ASSOCIATION
Quality cast in concrete

PREFACE

Successful masonry depends on adequate design and specification of materials, sound construction practice and an acceptable quality of workmanship. Good workmanship is in turn dependent on access to accepted norms of local detailing practice and materials.

The purpose of this booklet is to provide guidelines for the detailing of concrete masonry structures. It should be read in conjunction with the Concrete Manufacturers Association's Masonry Manual, the National Building Regulations, and National Home Builders Registration Council Home Building Manual the relevant South African Bureau of Standards specifications and codes of practice.

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USE OF COMPUTER AIDED DESIGN (CAD)

The drawings in this manual are available on CD in various CAD formats.

Please contact the Concrete Manufacturers Association if you require this disc.

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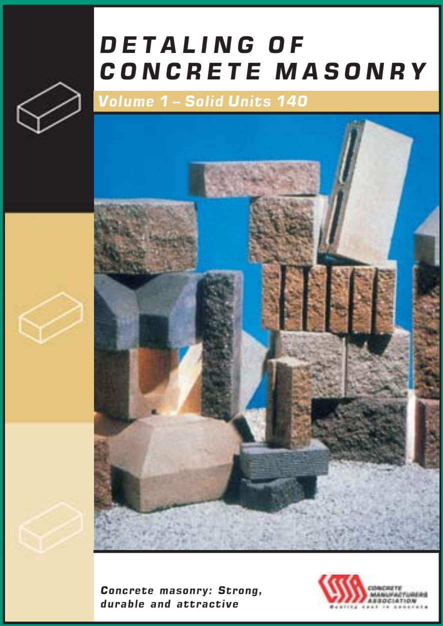

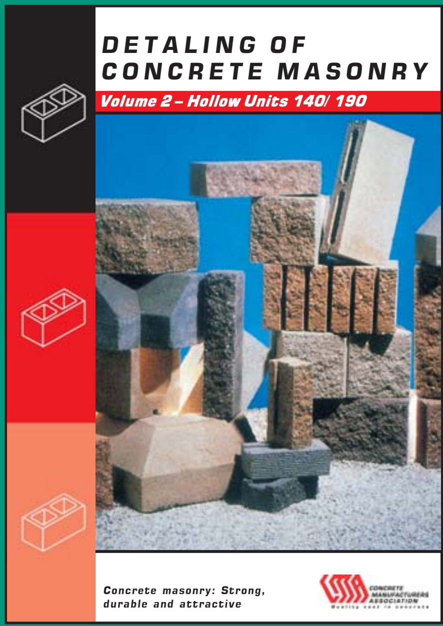

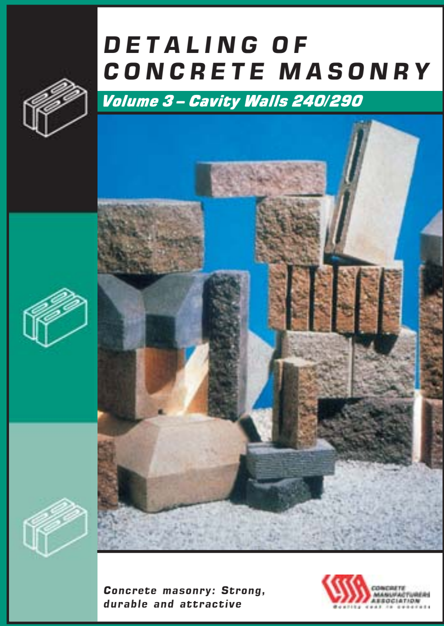

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Guidelines on the *DETAILING OF CONCRETE MASONRY*

VOLUME 3 CAVITY WALLS – 240mm to 290mm

J W Lane   J E Cairns

CONTENTS

Reference:

Refer to: Volume 1 for details of 140 mm solid unit walls

Volume 2 for details of 140mm and 190 mm hollow unit walls

GUIDELINES ON THE DETAILING OF MASONRY STRUCTURES REFERENCE CODING SYSTEM

DESCRIPTION OF WALL		Computer Reference Number
SOLID UNIT SINGLE LEAF WALLS 140mm		S-**-**
HOLLOW UNIT SINGLE LEAF WALLS 140 AND 190 mm		H-**-**
CAVITY WALLS 240 TO 290 mm		C-**-**
POSITION IN WALLS		
AIRCONDITIONING UNITS		C-AC-**
BEAM TO WALL		C-BW-**
BONDING PATTERNS		C-BP-**
CONTROL JOINTS		C-CJ-**
DOOR FRAMES		C-DF-**
FOUNDATIONS AND GROUND FLOOR SLAB		C-FG-**
INTERSECTION	WALL TO WALL	C-WW-**
	WALL TO COLUMN (CONCRETE)	C-CC-**
	WALL TO COLUMN (STEEL)	C-CS-**
	WALL TO COLUMN (MASONRY)	C-CM-**
	WALL TO COLUMN (PILASTERS)	C-CP-**
JOINT PROFILES		C-JP**
LINTELS		C-LI-**
PARAPET WALLS INCLUDING COPING		C-PW-**
REINFORCING		C-RE-**
ROOF SLABS		C-RS-**
ROOF TRUSSES		C-RT-**
SERVICES		C-SV-**
SILLS		C-SI-**
SUSPENDED FLOOR		C-SF-**
WINDOW FRAMES		C-WF-**
NOTES		C-**-NB

Notes:

The computer reference number is the file name under which the individual drawings are stored. The last two digits (indicated with an asterix above) represent the numbering of drawing in that particular category. Where the last two digits are replaced with the letter "NB", this file contains notes which are pertinent to the drawings in the particular category.

GENERAL NOTES

Concrete masonry has wide applications in modern industrial, commercial, educational and residential buildings.

The main types of masonry walls dealt with in these guidelines are: single leaf walls using solid units (Vol 1), single leaf walls using hollow units (Vol 2) and cavity walls (Vol 3).

The details shown in this publication are intended merely as a guide. Each construction situation is unique and there are many factors to be considered before a detail is finalised – far too many for inclusion here.

The purpose of good detailing is to assist in achieving sound construction and a buildable structure that will perform well in service.

The following factors must be taken into account when detailing for concrete masonry structures:

Materials:

- Concrete masonry units:
  solid/hollow – dimensions
  non-face/face – texture, colour and profile properties and availability.
- Mortar:
  Class to be used plus materials. (Will mortar sand result in high shrinkage of mortar and wall?)

Environmental conditions:

- Environment:
  Orientation
  Likelihood of significant movement due to temperature and moisture variations
- Earth/Seismic movement

Service conditions:

- Loading:
  dead, imposed, wind, unexpected
- Aggressive conditions:
  corrosion

Type of structure

- Unreinforced/reinforced/prestressed
- Composite structure:
  masonry/reinforced concrete
  masonry/prestressed concrete
  masonry/structural steel
  masonry/timber and their interaction
- Degree of fixity between elements and likely movement.
- Special finishes and specification requirements.
- Workmanship quality

Design

- Modular co-ordination of building elements work to 200mm module horizontally and 100mm vertically.

Details in these guidelines do not necessarily apply to masonry structures over four storeys in height.

Unless otherwise stated, the details shown are based on the "deemed to satisfy" clauses of SANS 10400 and the NHBRC Home Building Manual (HBM).

In SABS standard only strip foundations are covered, but there may be a need for special foundations in particular cases. Authoritative advice should be obtained in this regard.

The information contained in this publication is intended as a guide only. The Concrete Manufacturers Association cannot be held responsible for its interpretation and use.

Width of cavity walls

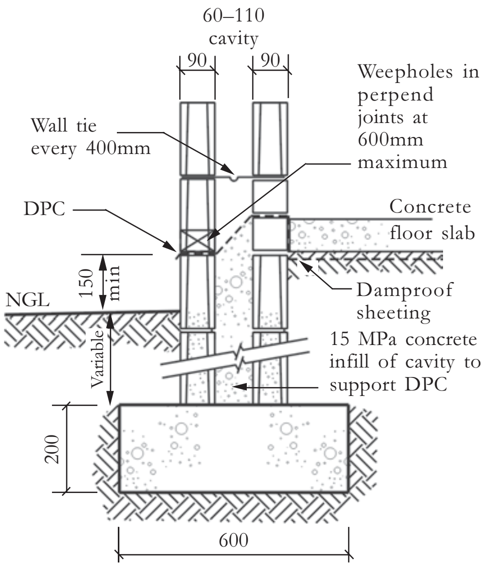
SANS 10400 The application of the National Building Regulations details cavity walls of 90–50 to 90–100–90 i.e. 230 to 290 mm cavity walls.

A 230 mm cavity wall is not modular. This means that there is considerable cutting of units in the building of these walls. However, if the cavity is increased to 60 mm with an overall width of 240 mm walls become more buildable. At the edge of door and window frames a 90 and a 140 mm unit can be used to close the cavity. In structural 240 mm cavity walls the inner structural leaf can be 140 and the outer non-structural leaf 90 mm.

The preferred dimensions of a cavity wall are 90–110–90 i.e. 290 mm overall. This wall is completely modular and can be built with minimum cutting of units. Closing of cavity around windows, doors, sills and lintels can be easily achieved using two 140 mm blocks or a 90 mm and 190 mm block.

C-FG-01

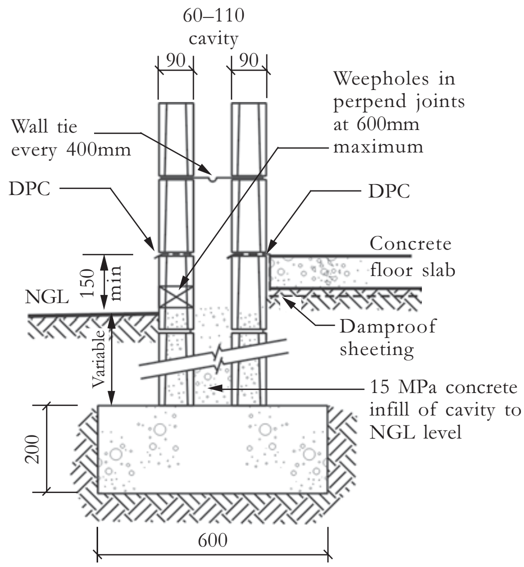
See C-FG-NB



STRIP FOUNDATION

C-FG-02

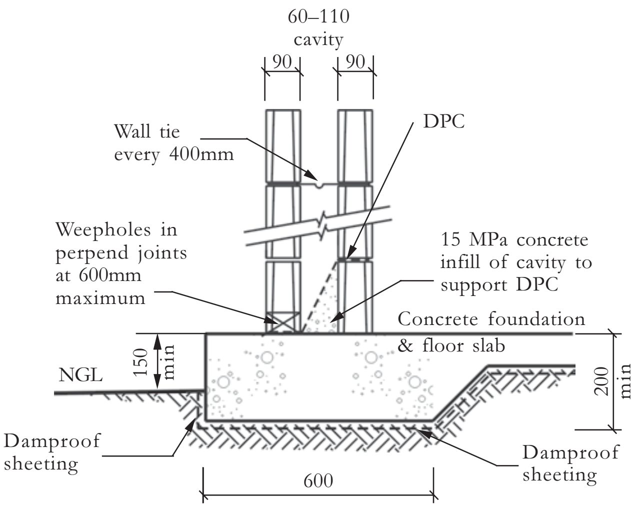
See C-FG-NB



STRIP FOUNDATION

C-FG-03

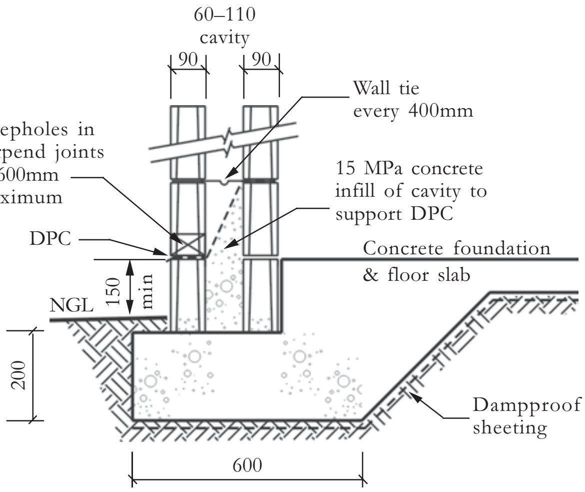
See C-FG-NB



THICKENED SLAB FOUNDATION

C-FG-04

See C-FG-NB

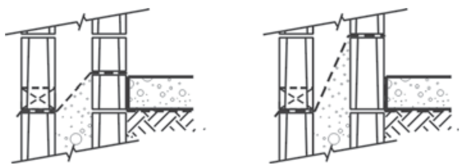


THICKENED SLAB FOUNDATION

C-FG-NB

Note:

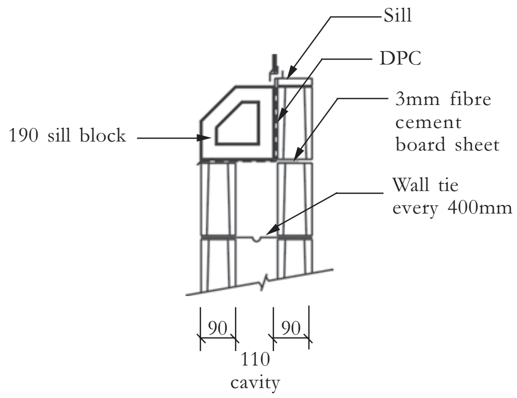
1. Thickened slab foundations may cause cracking with ground floor slab. Consider use of fabric reinforcement in slab to limit cracking, or construction joints at junction of floor slab and foundation.
2. The bearing capacity and sensitivity to moisture changes of soil may be unsatisfactory with thickened slab foundations.
3. Foundation dimensions based on SANS 10400. Refer to SANS 10161:1980 'The Design of Foundations for Building' for foundation sizes based on specific soil conditions.
4. Foundation material conditions will determine whether wall, concrete and steel columns share a common foundation around the column foundation area. Estimates of likely settlement between wall and column will determine the need or otherwise for movement (control) joints in the wall.
5. Stepped DPC height may be over half height of block.



6. For internal walls refer to Volume 1 – 140mm Solid Unit Single Leaf Walls and Volume 2 – 140mm or 190mm Hollow Unit Single Leaf Walls.

C-SI-01

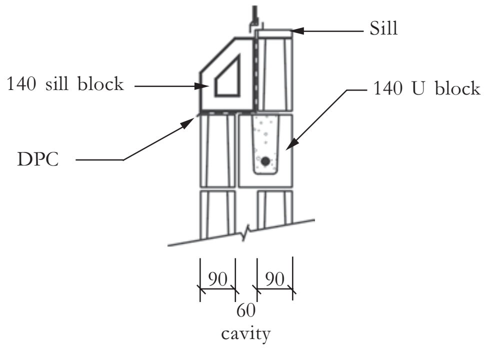
See C-SI-NB



190mm WIDE SILL BLOCK – 290mm WALL

C-SI-02

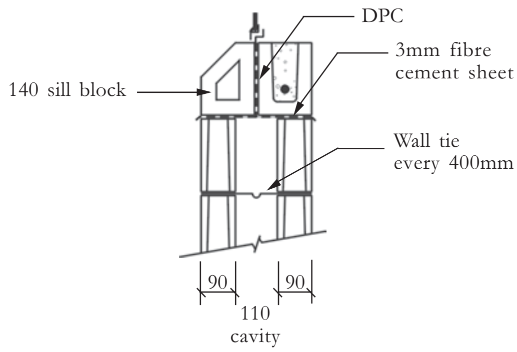
See C-SI-NB



140mm WIDE SILL BLOCK – 240mm WALL

C-SI-03

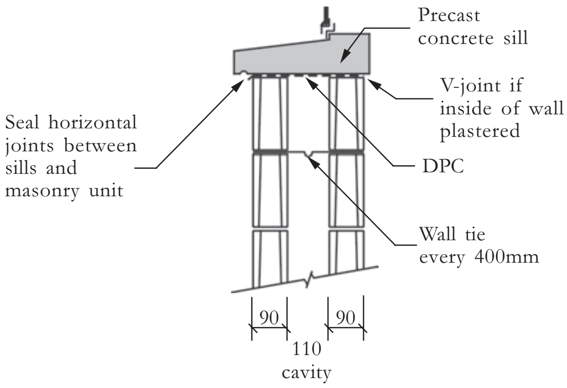
See C-SI-NB



140mm WIDE SILL BLOCK – 290mm WALL

C-SI-04

See C-SI-NB



PRECAST CONCRETE SILL

C-SI-NB

Note:

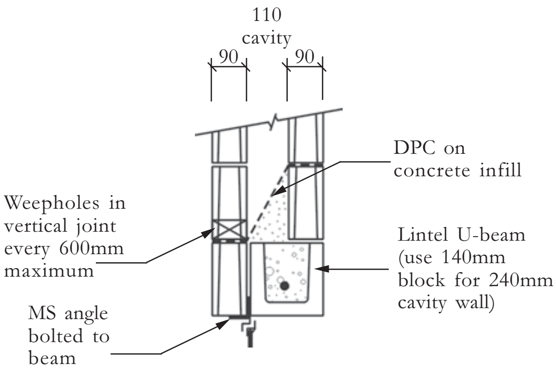
1. Clear water-repellent coating to be applied to masonry sill block exposed surfaces.

WINDOW LINTEL DETAILS

C-LI-01

See C-FG-NB Note 5

See C-LI-NB

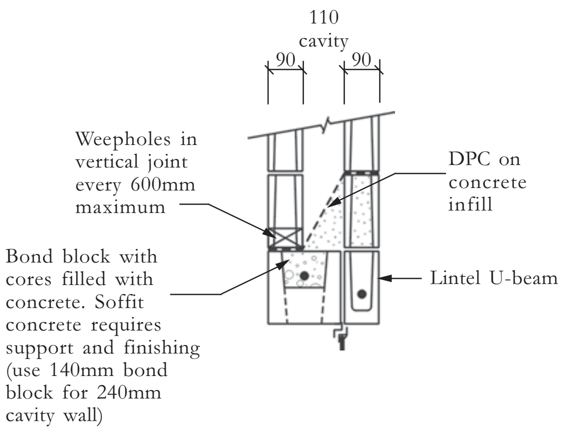


LINTEL USING 190mm U-BEAM

C-LI-02

See C-FG-NB Note 5

See C-LI-NB

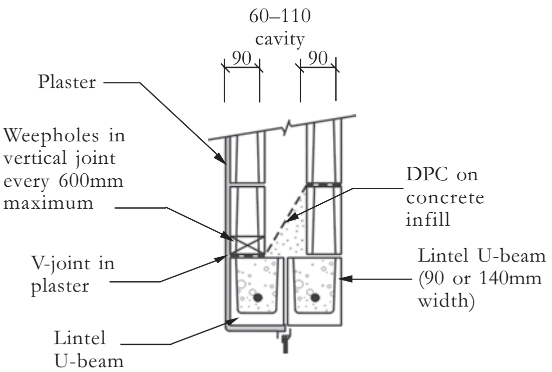


LINTEL USING 190mm BOND BLOCK BEAM

C-LI-03

See C-FG-NB Note 5

See C-LI-NB



LINTEL USING 140 U-BEAM

C-LI-NB

Note:

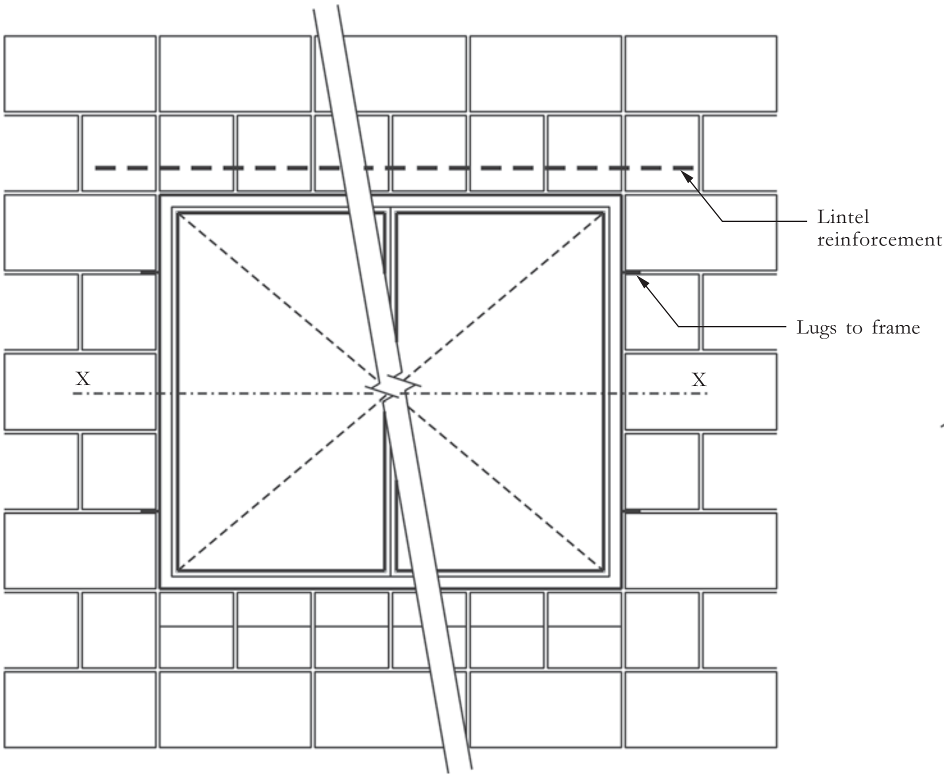
1. Refer to CMA Design Guide and Technical Notes on Lintels.
2. Lintel units manufactured in different lengths

Unit	Lengths
Lintel sash block	190mm
U-block	190/390mm
Rock face bond block	190/390mm
Fairface bond block	390mm

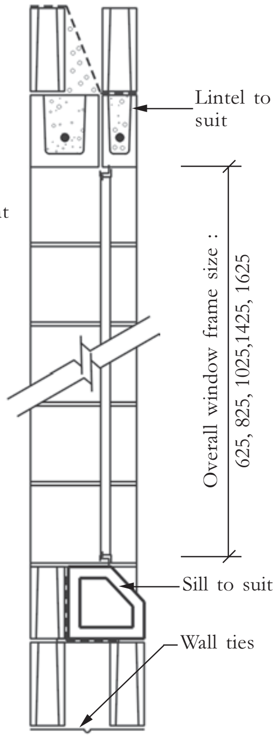
3. For rockface units use bond blocks or rock face units supported on angle. For smooth face use U- or sash lintel units.

C-WF-01

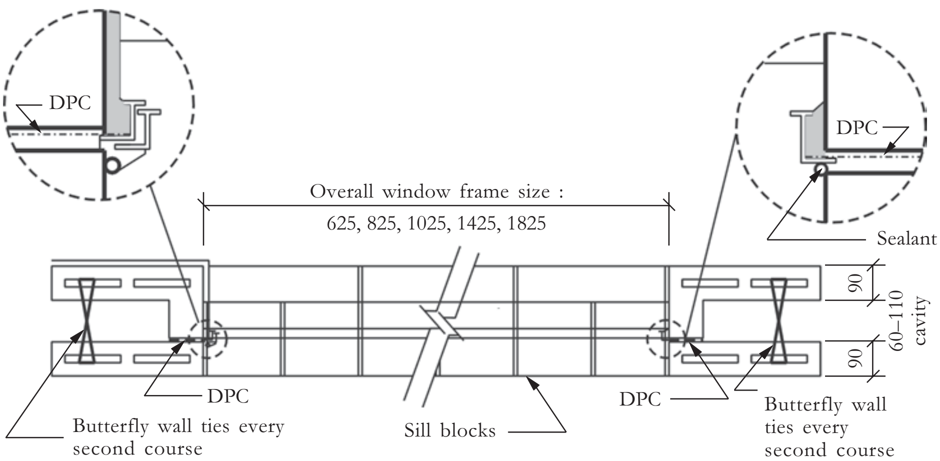
See C-SI-01/04
See C-LI-01/03



FRONT ELEVATION



SECTION

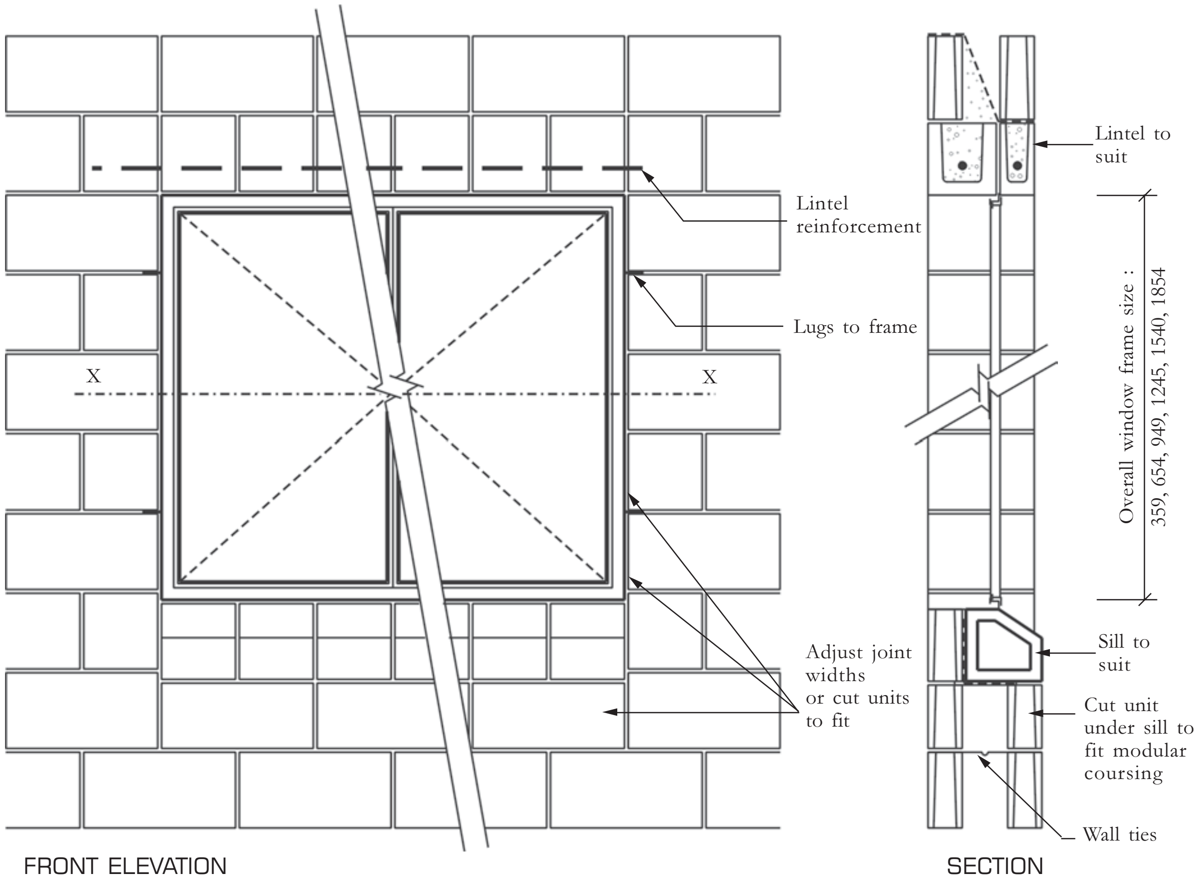


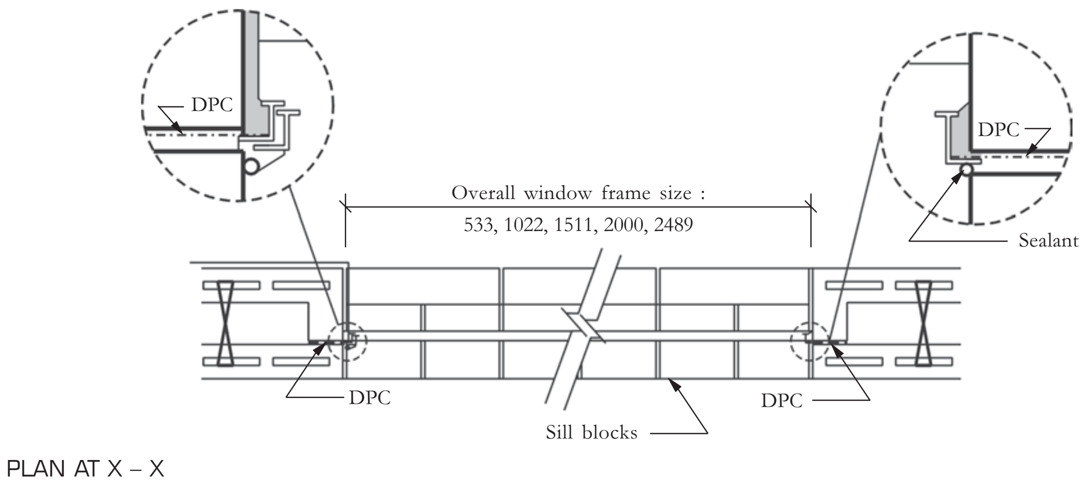
PLAN AT X – X

STEEL WINDOW FRAMES OF MODULAR DIMENSIONS

C-WF-02

See C-SI-01/04
See C-LI-01/03

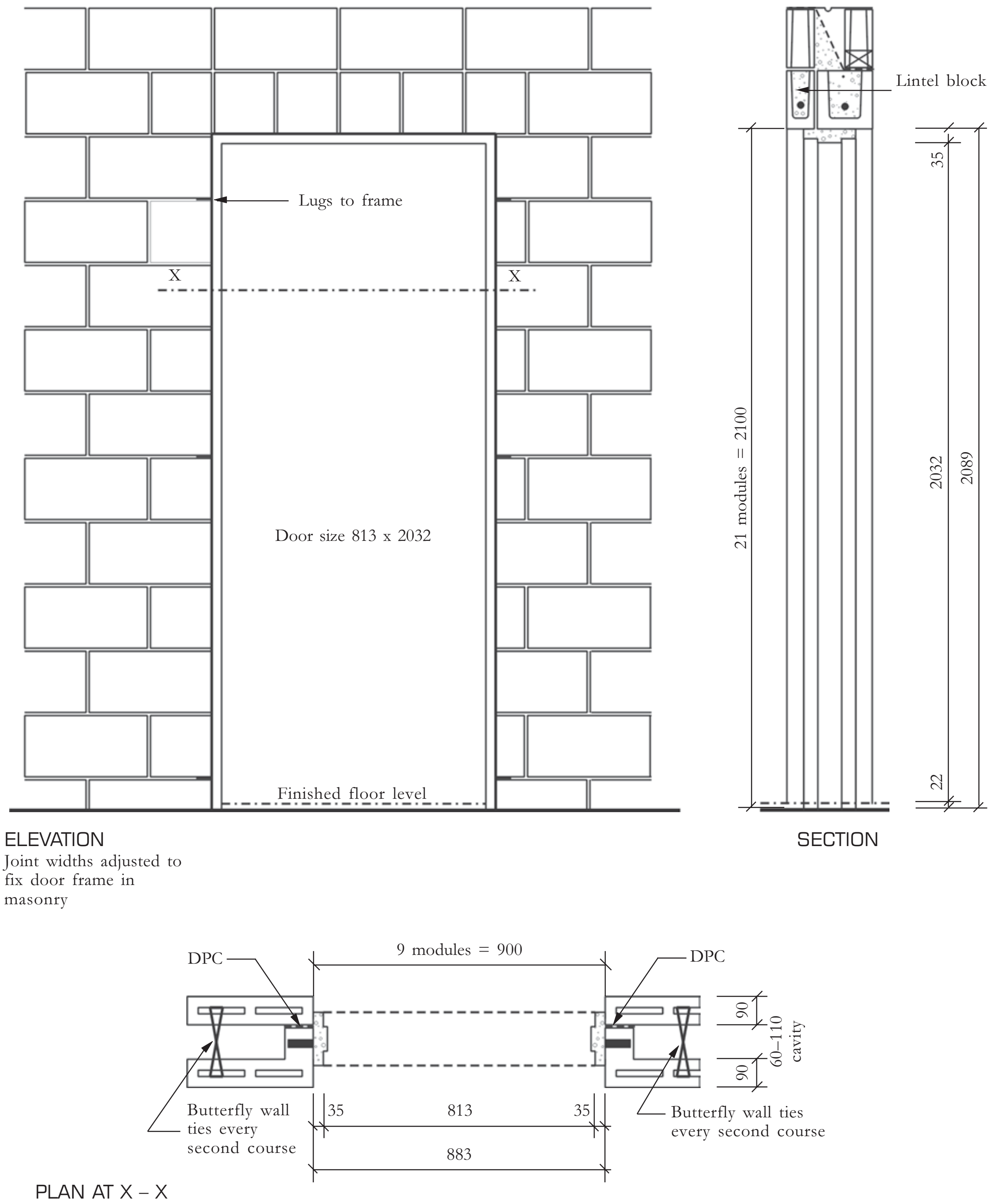




STEEL WINDOW FRAMES OF NON-MODULAR DIMENSIONS

DOOR FRAME DETAILS – STEEL FRAMES

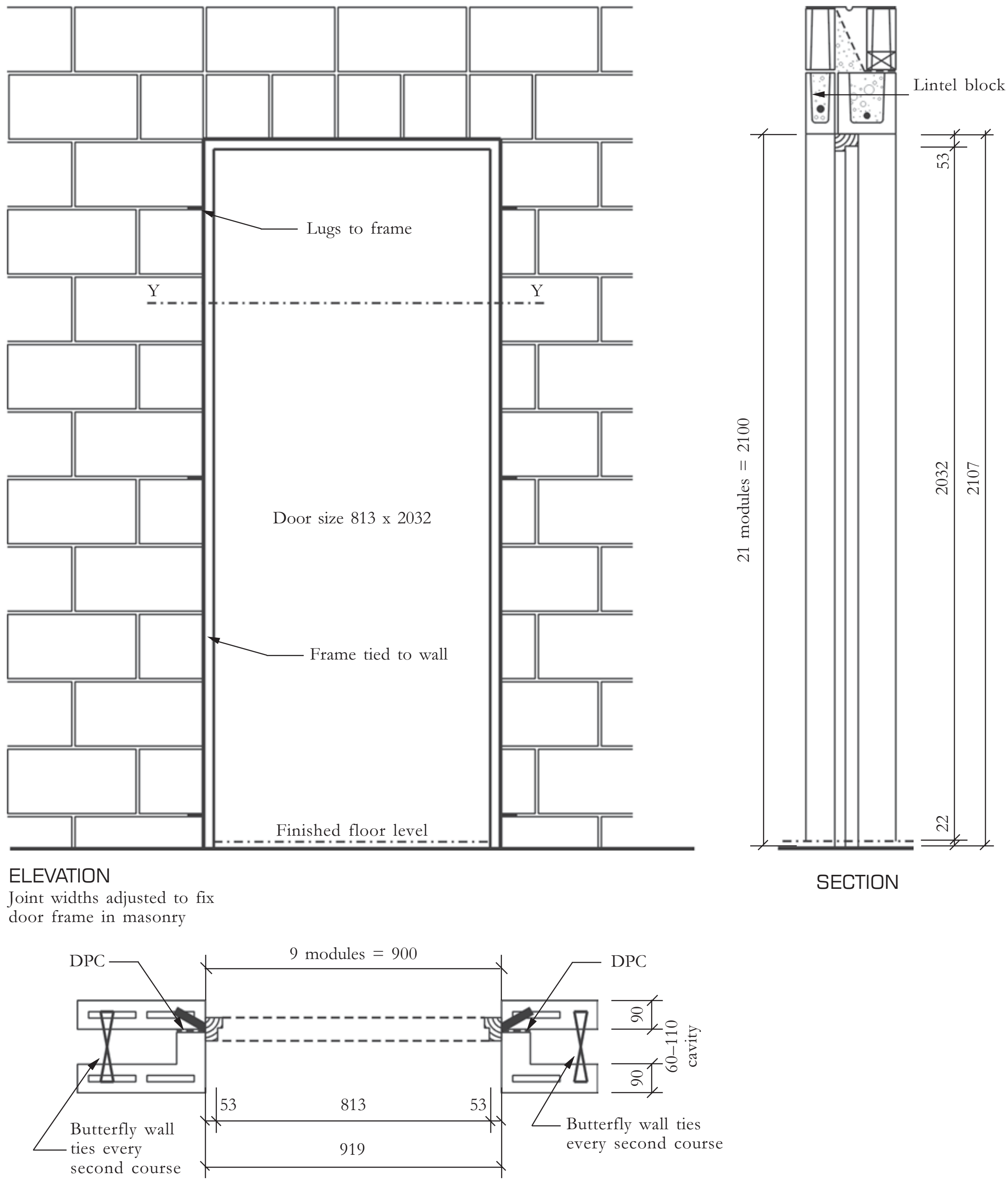
C-DF-01



STEEL DOOR FRAME TO TAKE 813 x 2032 DOOR

DOOR FRAME DETAILS – TIMBER FRAMES

C-DF-02



PLAN AT Y – Y

TIMBER DOOR FRAME TO TAKE 813 x 2032 DOOR

INDEX TO SUSPENDED FLOORS ON EXTERNAL WALLS

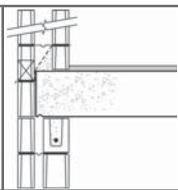
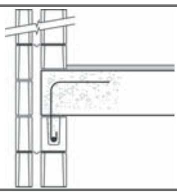
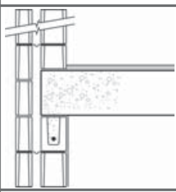
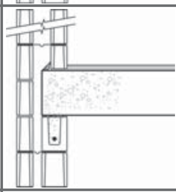
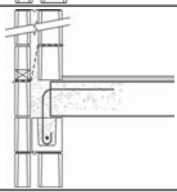
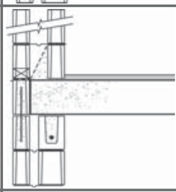
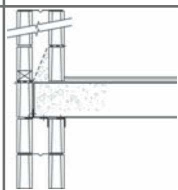
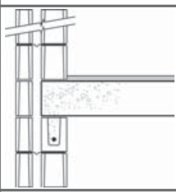
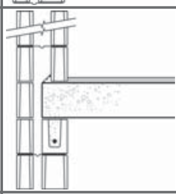
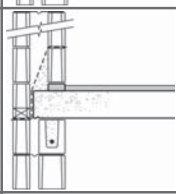
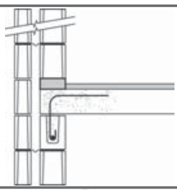
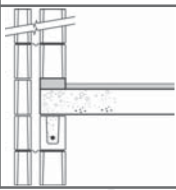
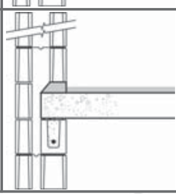
Many factors influence the detail to be used at the junction of suspended concrete floors. Consideration should be given to the following:

STRUCTURAL ASPECTS

- Is wall below slab structural or non-structural?
- Is wall above slab structural or non-structural?
- Is allowance to be made for vertical differential movement between structural and non-structural leaves of wall (important in cavity walls)?
- Is allowance to be made between top of supporting structural wall and slab for horizontal movement i.e. sliding? Or should there be fixity between wall and slab? (Note: This affects both design of wall and slab)

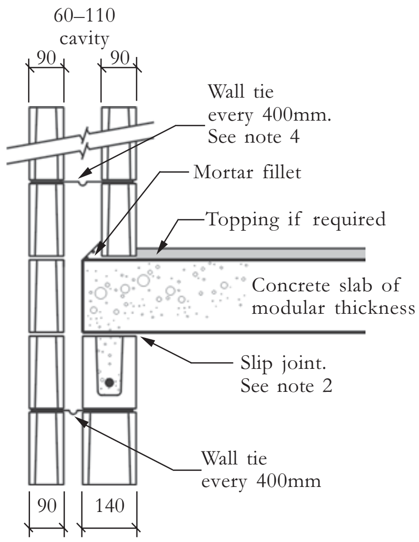
DETAILING ASPECTS

- Is slab of modular thickness (100, 200, 300, 400mm) or non-modular thickness? If slab thickness less than modular use concrete fillets above slab to restore modular thickness. If slab thickness greater than modular use cut blocks above slab to restore modular coursing. Does suspended slab close cavity or not?
- Is dampproofing required and if so DPC profile and position or weepholes?
- Space does not permit all alternatives to be detailed and drawn. The index gives references to typical sketches.

			WALL UNDER SLAB	STRUCTURAL			NON-STRUCTURAL
			WALL ABOVE SLAB	**STRUCTURAL**		**NON-STRUCTURAL**	
			WALL/SLAB FIXITY	**YES**	**NO**		
SLAB THICKNESS	GREATER THAN MODULAR	CAVITY	CLOSED			 C-SF-07	
			OPEN	 C-SF-11	 C-SF-09	 C-SF-05	
	MODULAR	CAVITY	CLOSED	 C-SF-12		 C-SF-03	 C-SF-14
			OPEN		 C-SF-02	 C-SF-01	 C-SF-13
	LESS THAN MODULAR	CAVITY	CLOSED			 C-SF-06	
			OPEN	 C-SF-10	 C-SF-08	 C-SF-04	

C-SF-01

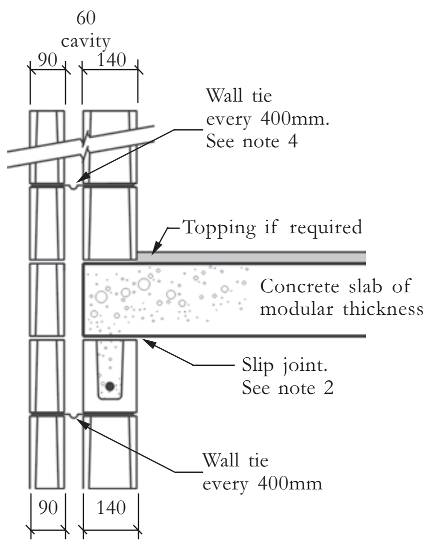
See C-SF-NB



WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: MODULAR THICKNESS
CAVITY: OPEN

C-SF-02

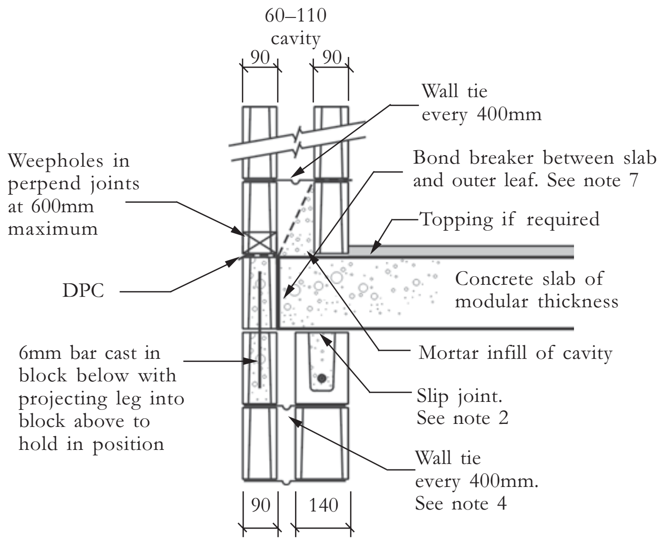
See C-SF-NB



WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: MODULAR THICKNESS
CAVITY: OPEN

C-SF-03

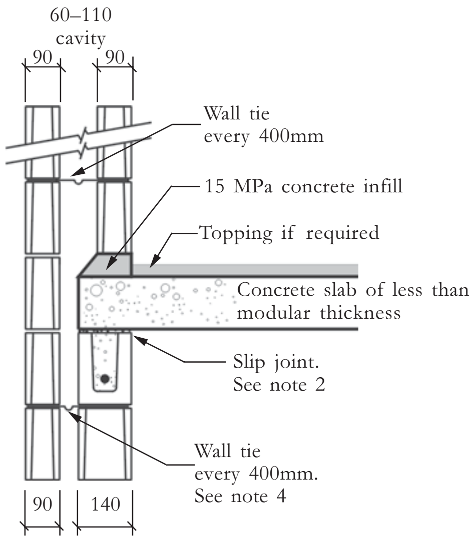
See C-SF-NB



WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: MODULAR THICKNESS
CAVITY: CLOSED

C-SF-04

See C-SF-NB

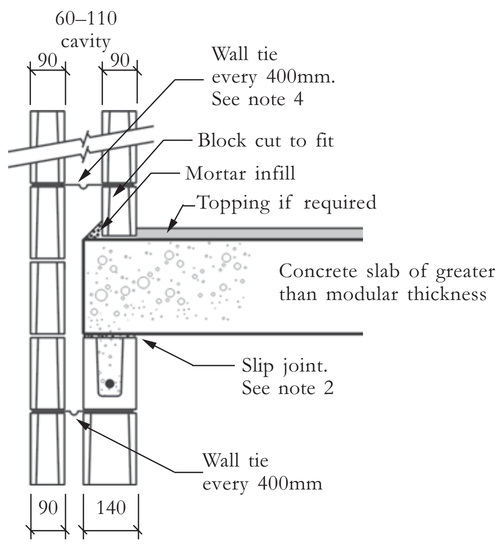


WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: < MODULAR THICKNESS
CAVITY: OPEN

SUSPENDED FLOORS ON EXTERNAL WALLS

C-SF-05

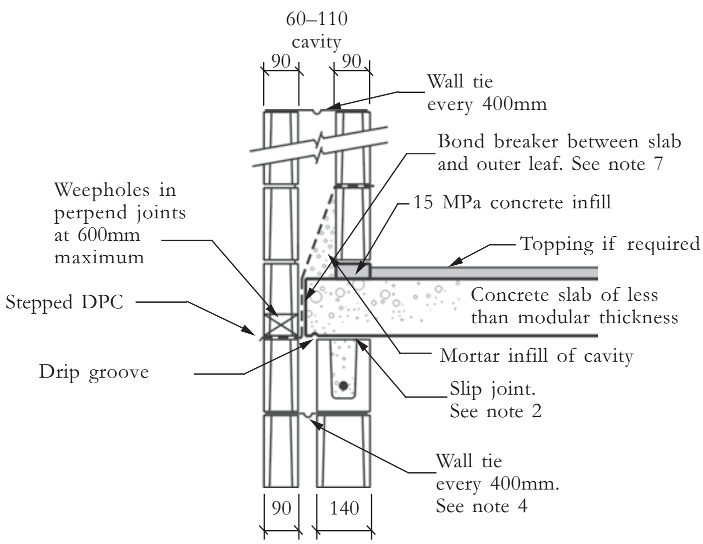
See C-SF-NB



WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: > MODULAR THICKNESS
CAVITY: OPEN

C-SF-06

See C-SF-NB

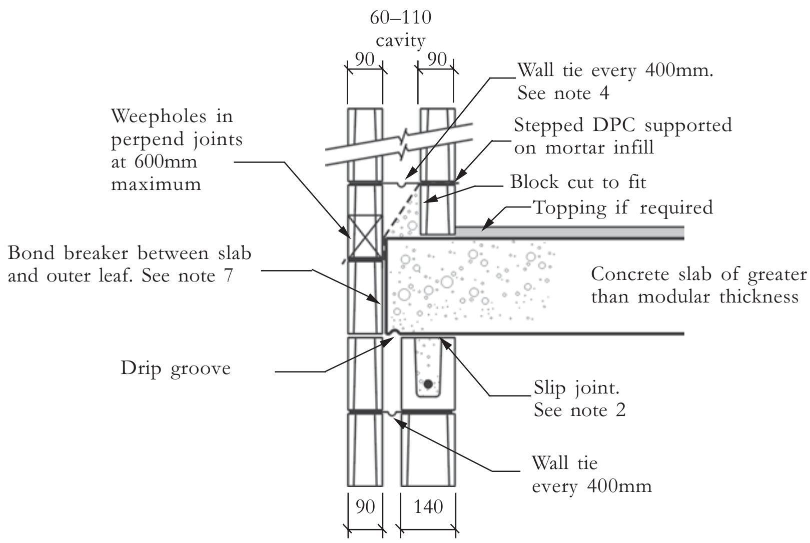


WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: < MODULAR THICKNESS
CAVITY: CLOSED

SUSPENDED FLOORS ON EXTERNAL WALLS

C-SF-07

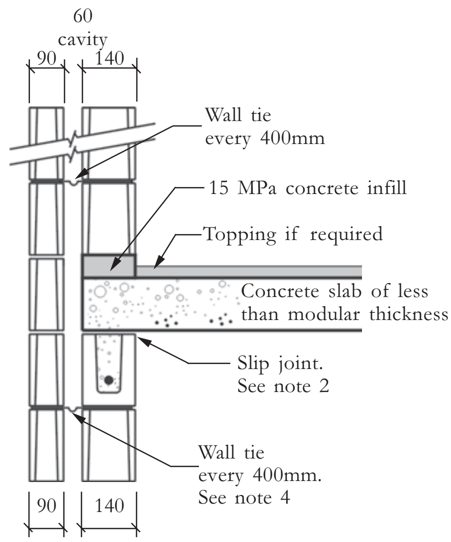
See C-SF-NB



WALL: INNER LEAF -STRUCTURAL BELOW SLAB
-NON STRUCTURAL ABOVE SLAB
OUTER LEAF NON-STRUCTURAL
SLAB: > MODULAR THICKNESS
CAVITY: CLOSED

C-SF-08

See C-SF-NB

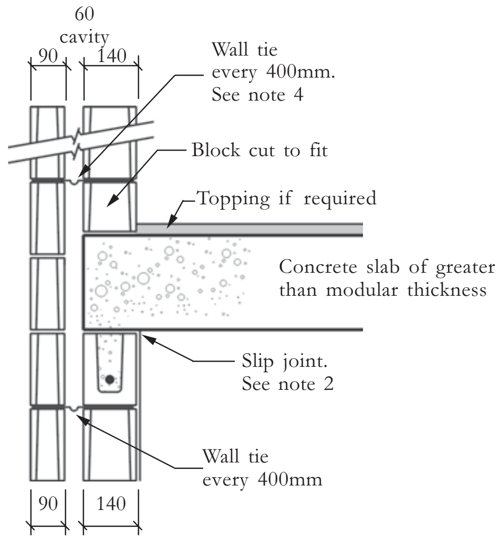


WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: < MODULAR THICKNESS
CAVITY: OPEN

SUSPENDED FLOORS ON EXTERNAL WALLS

C-SF-09

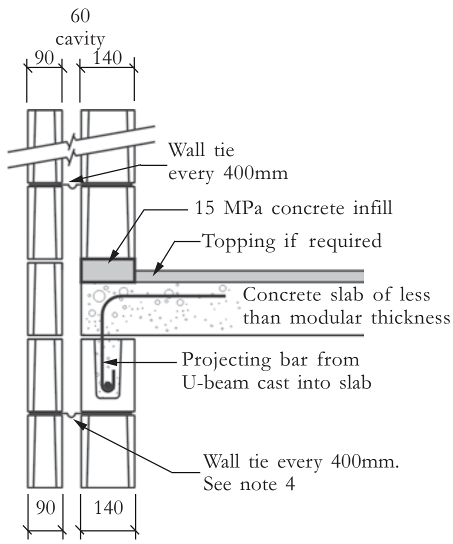
See C-SF-NB



WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: > MODULAR THICKNESS
CAVITY: OPEN

C-SF-10

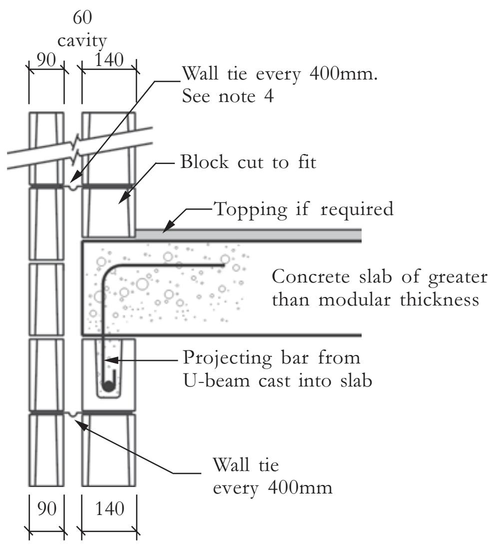
See C-SF-NB



WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: < MODULAR THICKNESS
CAVITY: OPEN
WALL/SLAB: FIXITY

C-SF-11

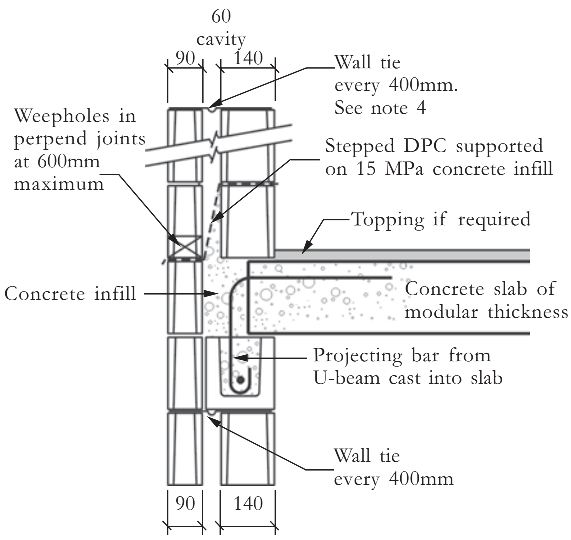
See C-SF-NB



WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: > MODULAR THICKNESS
CAVITY: CLOSED
WALL/SLAB: FIXITY

C-SF-12

See C-SF-NB

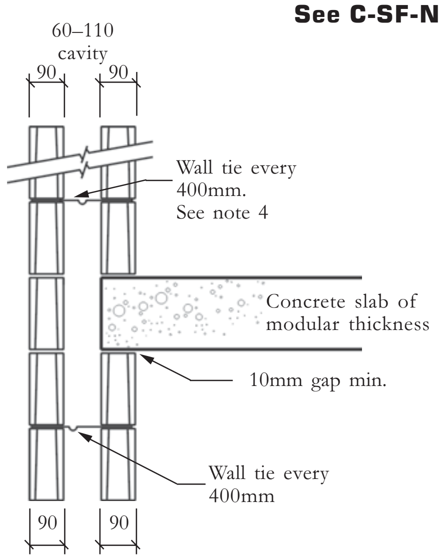


WALL: INNER LEAF STRUCTURAL
OUTER LEAF NON-STRUCTURAL
SLAB: MODULAR THICKNESS
CAVITY: CLOSED
WALL/SLAB: FIXITY

SUSPENDED FLOORS ON EXTERNAL WALLS

C-SF-13

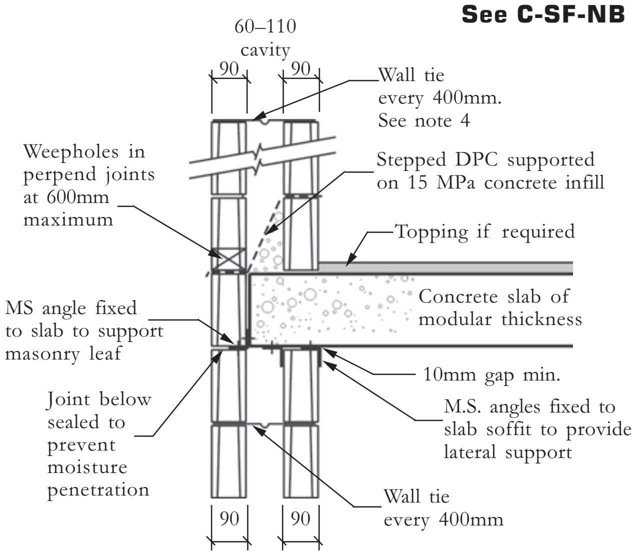
See C-SF-NB



WALL: **INNER LEAF NON-STRUCTURAL**
OUTER LEAF NON-STRUCTURAL
SLAB: **MODULAR THICKNESS**
CAVITY: **OPEN**

C-SF-14

See C-SF-NB

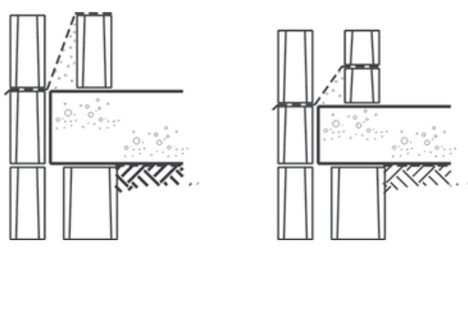


WALL: **INNER LEAF NON-STRUCTURAL**
OUTER LEAF NON-STRUCTURAL
SLAB: **MODULAR THICKNESS**
CAVITY: **CLOSED**

C-SF-NB

Note:

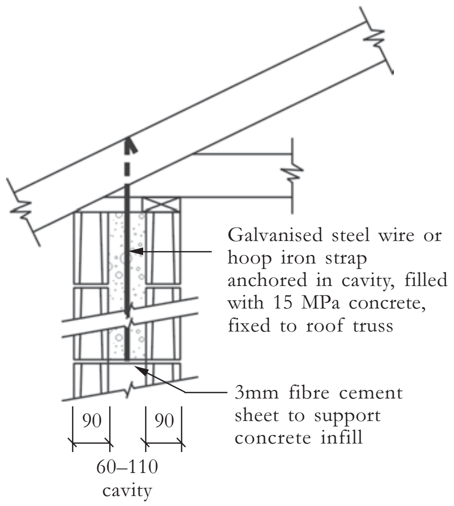
1. Stepped DPC to rest on mortar/concrete infill.
2. If floor slab exceeds 6m spanning on to wall and large movements are expected consider a slip joint on top of wall, such as two layers of DPC or galvanised sheets or kilcher bearings or similar. Structural stability and robustness may preclude use of slip joint.
   If designer assumes wall laterally restrained by slab then slip joint not advisable.
3. 90mm minimum bearing under slab.
4. Wall ties to be built in as shown at horizontal spacing not exceeding 400mm.
5. Generally 90mm thick walls are non-structural. 140mm thick wall can be used in place of 90mm thick internal leaf to support slab.
6. Internal structural walls may be 90mm thick with piers, or 140mm or 190mm thick.
7. Use bond breaker (plastic sheet, bitumen, paint etc.) between outer leaf and beam/slab at (point of contact) where differential movement is expected.
8. Stepped DPC height may be over full or half height of block.



ROOF TRUSS FIXING TO WALL

C-RT-01

See App D

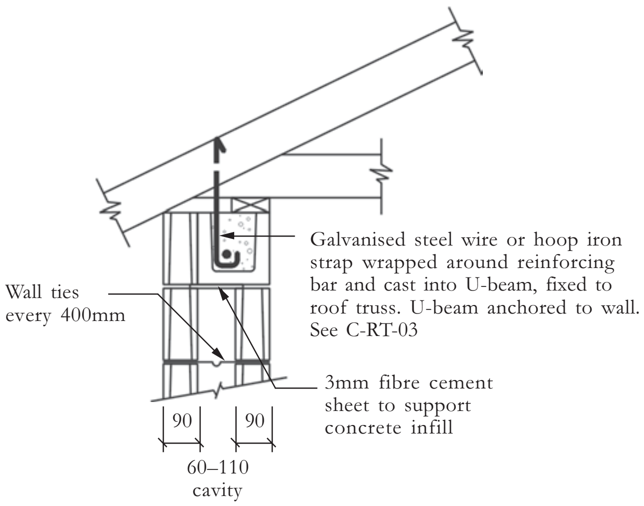


ROOF TRUSS FIXING TO CAVITY WALL

C-RT-02

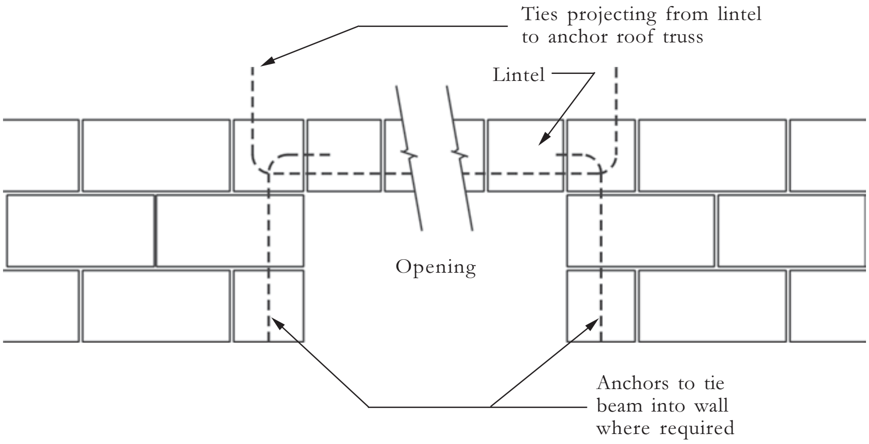
See App D

See C-RT-03



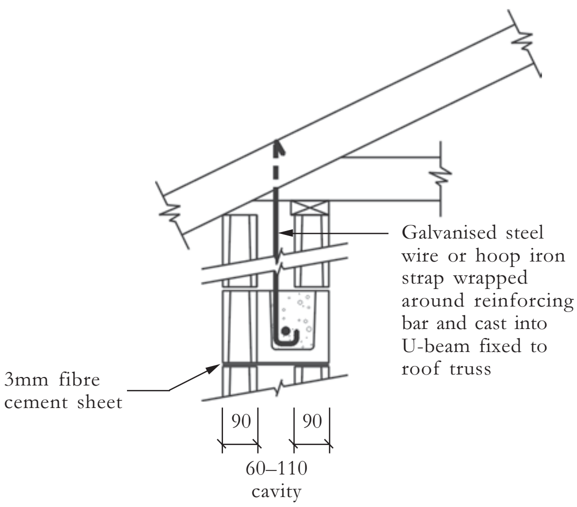
ROOF TRUSS FIXING TO CAVITY WALL, OVER OPENING

C-RT-03
See App D



ANCHORING OF BEAM OVER OPENINGS

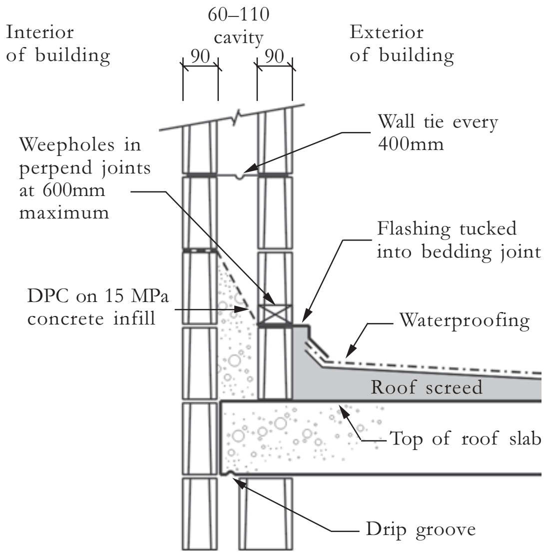
C-RT-04
See App D



ROOF TRUSS FIXING CAVITY WALL

C-RS-01

See C-RS-NB



WATERPROOFING TO ROOF AND DRAINAGE OF PARAPET WALL

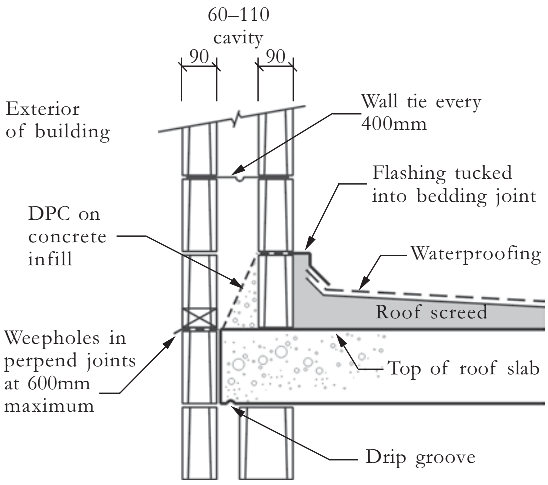
C-RS-NB

Note:

1. Details of junction of roof slabs on walls are as for junction of suspended slabs on walls.
2. Refer to details C-SF-01 to 14 and C-SF-NB.

C-RS-02

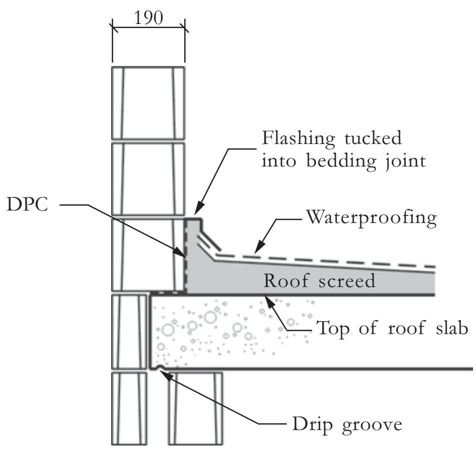
See C-RS-NB



WATERPROOFING TO ROOF AND DRAINAGE OF PARAPET WALL

C-RS-03

See C-RS-NB

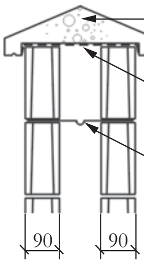


WATERPROOFING TO ROOF AND DRAINAGE OF 190mm PARAPET WALL

PARAPET WALL AND COPING DETAILS

C-PW-01

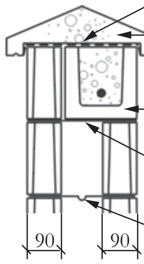
See C-PW-NB



PRECAST CONCRETE COPING ON CAVITY WALL

C-PW-02

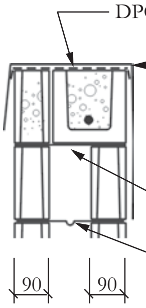
See C-PW-NB



PRECAST COPING ON BEAM

C-PW-03

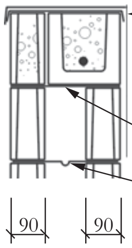
See C-PW-NB



METAL CAP

C-PW-04

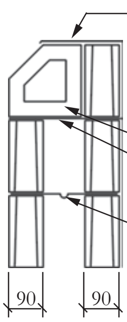
See C-PW-NB



LIQUID APPLIED WATERPROOFING SYSTEM

C-PW-05

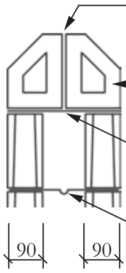
See C-PW-NB



MASONRY COPING

C-PW-06

See C-PW-NB



MASONRY COPING

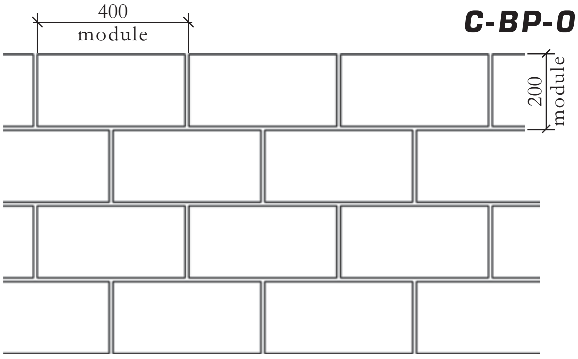
C-PW-NB

Note:

1. Parapet walls to be designed for wind loading
2. Where conditions are such that the coping is likely to be dislodged some mechanical fixing of coping to wall to be considered.
3. Parapet walls to be designed to accommodate horizontal movements whilst maintaining structural stability
4. Clear water repellent coating to be applied to external faces of masonry sill blocks.

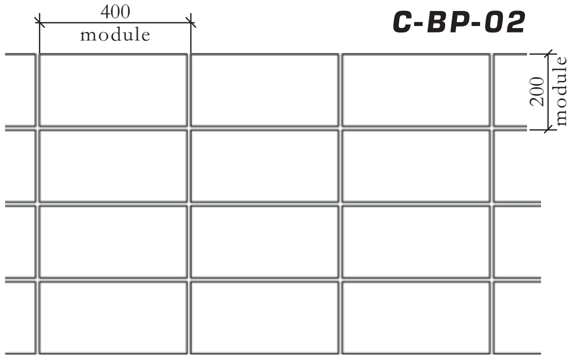
MASONRY BOND PATTERNS

C-BP-01



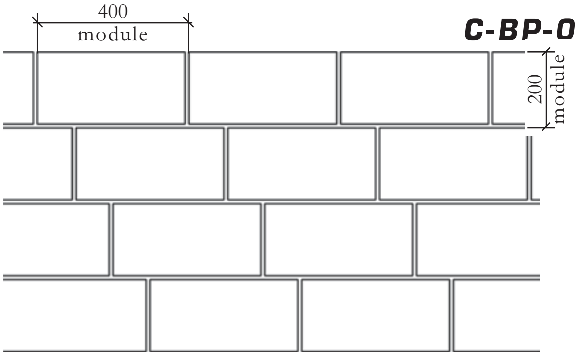
STRETCHER OR RUNNING BOND

C-BP-02



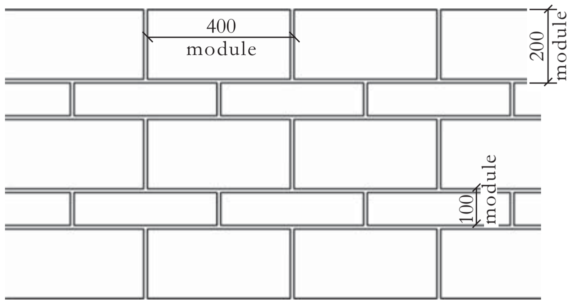
STACK BOND

C-BP-03



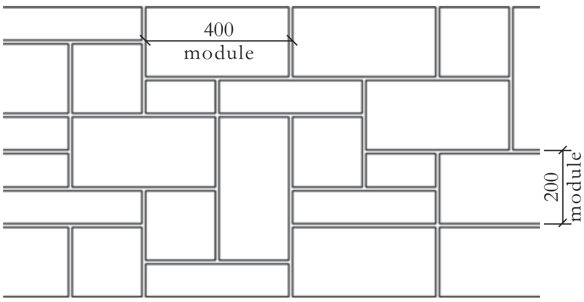
QUARTER BOND

C-BP-04



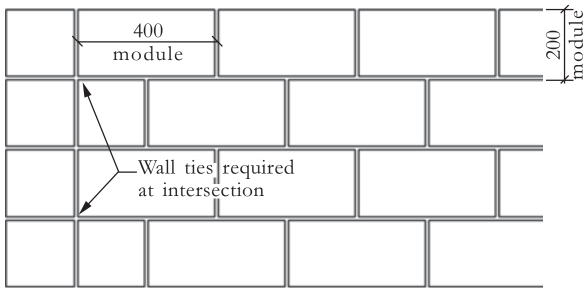
COURSED ASHLAR BOND

C-BP-05



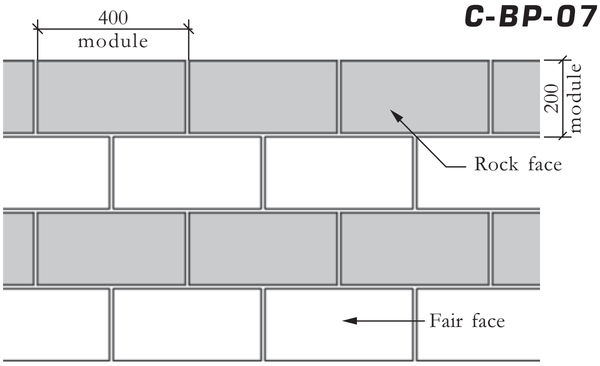
ASHLAR BOND

C-BP-06



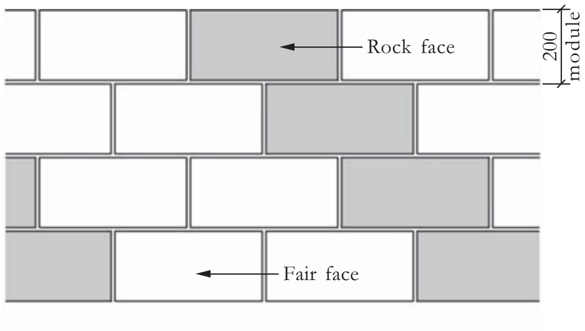
STRETCH BOND WITH STACK BOND PIER

C-BP-07



BANDING

C-BP-08



DIAGONAL PATTERN

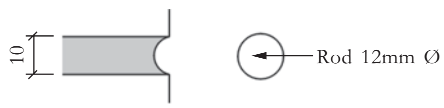
JOINT PROFILES

C-JP-01

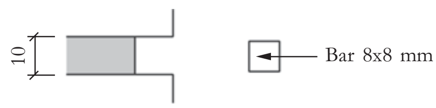
See C-JP-02

JOINT PROFILES FOR EXTERNAL WALLS SUBJECT TO WEATHER

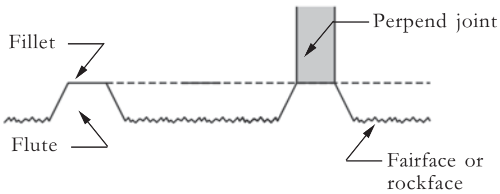
C-JP-02



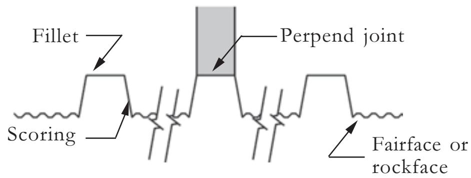
With fair face masonry with joint widths 10mm use 12mm Ø rod to rule joints when mortar thumb print hard



With rock face work with joint widths 10mm use 8x8mm square bar, or 8mm Ø round bar for concave joints, to rule joints when mortar thumb print hard



PLAN: FLUTED UNIT



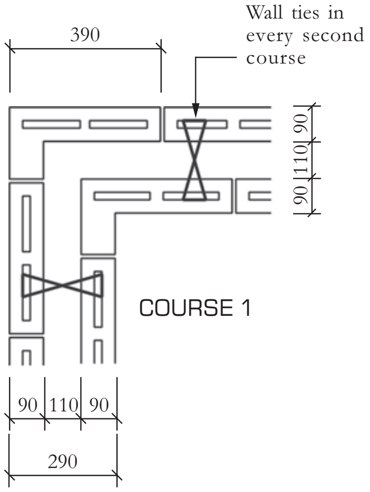
PLAN: SCORED UNIT

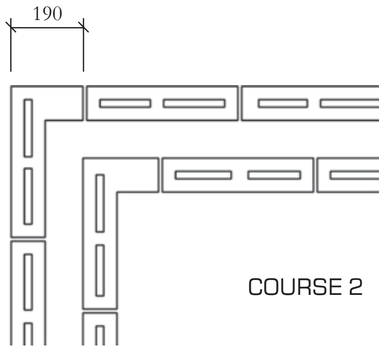
With fluted or scored units joint profile square and finished to fillet of fluting or scoring, unless otherwise specified

FINISHING OF BEDDING AND PERPEND JOINTS

WALL TO WALL INTERSECTIONS – CORNERS

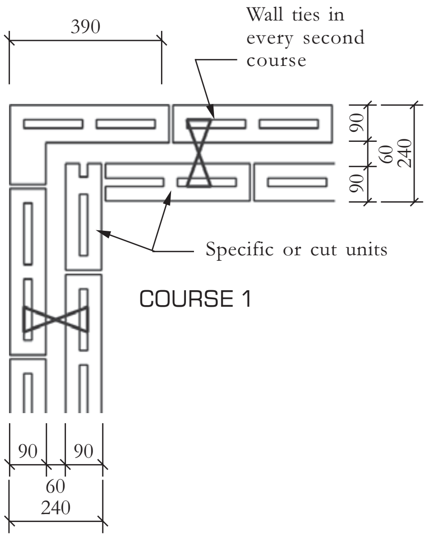
C-WW-01

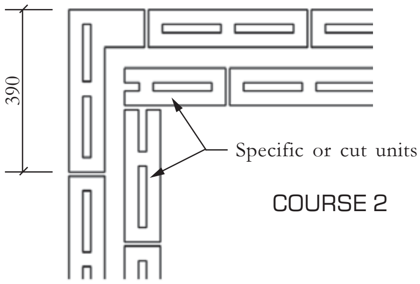




290mm : CAVITY WALLS

C-WW-02

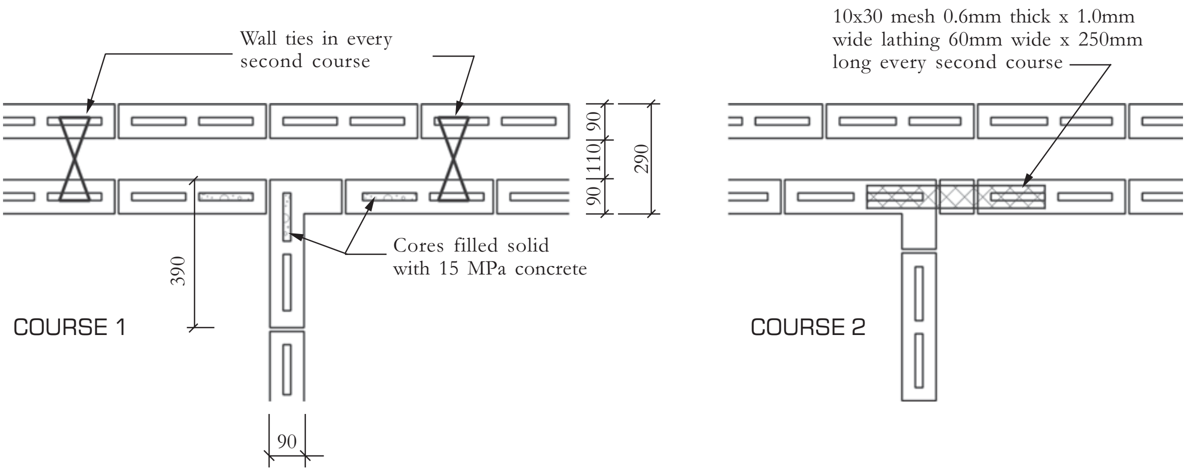




240mm : CAVITY WALLS

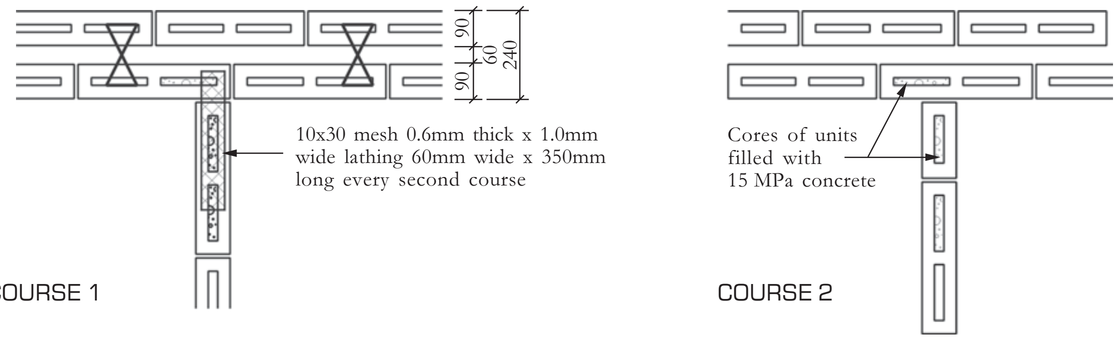
WALL TO WALL INTERSECTIONS

C-WW-03



BONDING OF INTERNAL LEAF OF CAVITY WALL

C-WW-04

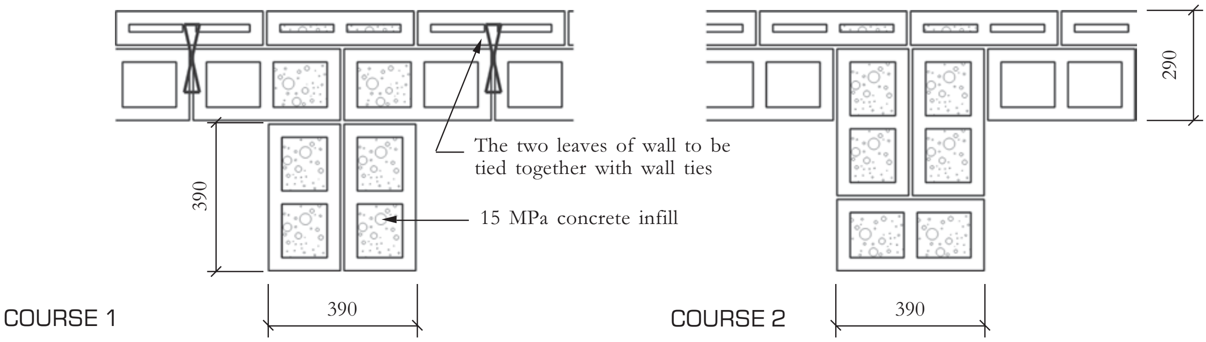


BONDING OF INTERNAL LEAF OF CAVITY WALL

PIERS IN 290mm FREESTANDING WALLS

C-CM-01

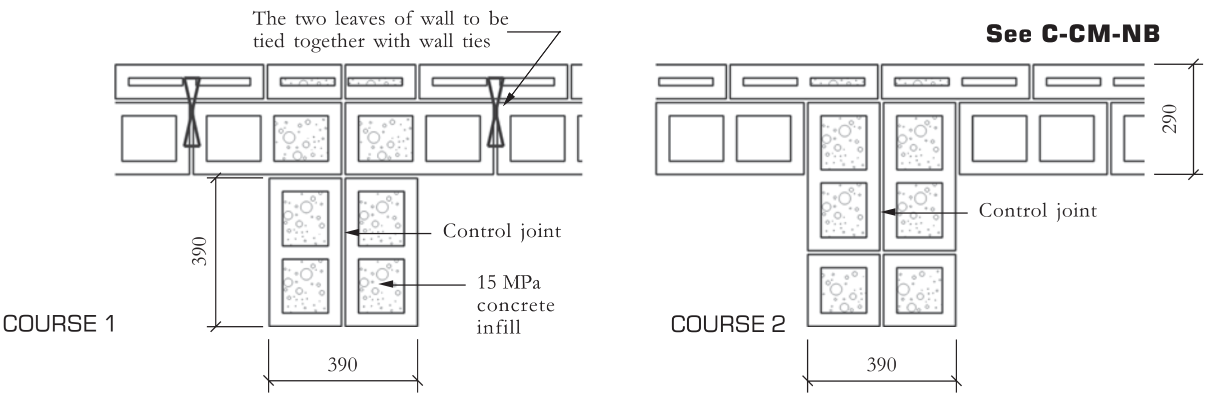
See C-CM-NB



390mm WIDE PIER 390mm PROJECTION – 290mm HOLLOW BLOCK SOLID WALL

C-CM-02

See C-CM-NB

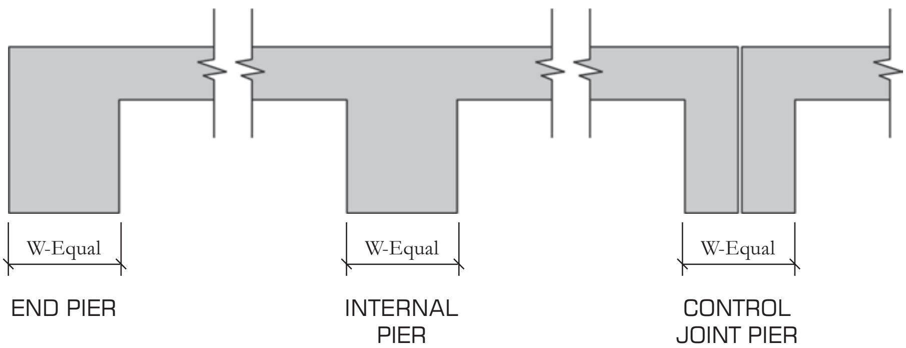


390mm WIDE PIER 390mm PROJECTION – 290mm HOLLOW BLOCK SOLID WALL WITH CONTROL JOINT

Note:

C-CM-NB

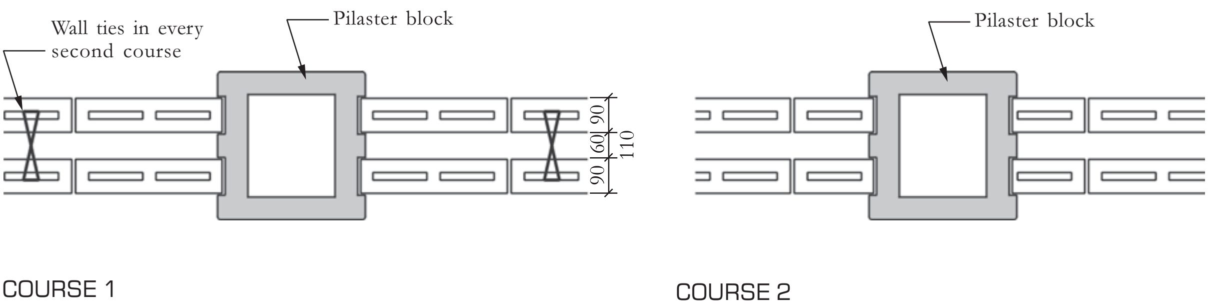
1. At the end of a freestanding wall the pier width and projection must be of the same dimensions as the internal piers. The two adjacent piers at control joints must together be of the same overall dimensions as an internal pier.
2. The thickness of the wall shown is that at the base and may be reduced nearer the top of the wall if designed in accordance with SANS 10400
3. Refer to CMA Design Guide on Free Standing Walls and SANS 10400



PILASTER BLOCKS IN WALLS

C-CP-01

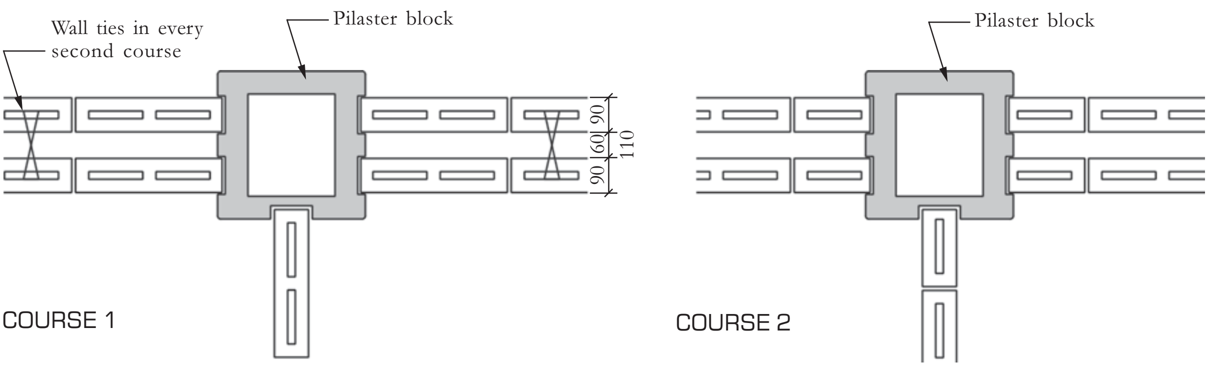
See C-CP-NB



PILASTER BLOCK FOR TWO WALLS

C-CP-02

See C-CP-NB



PILASTER BLOCK FOR THREE WALLS

C-CP-NB

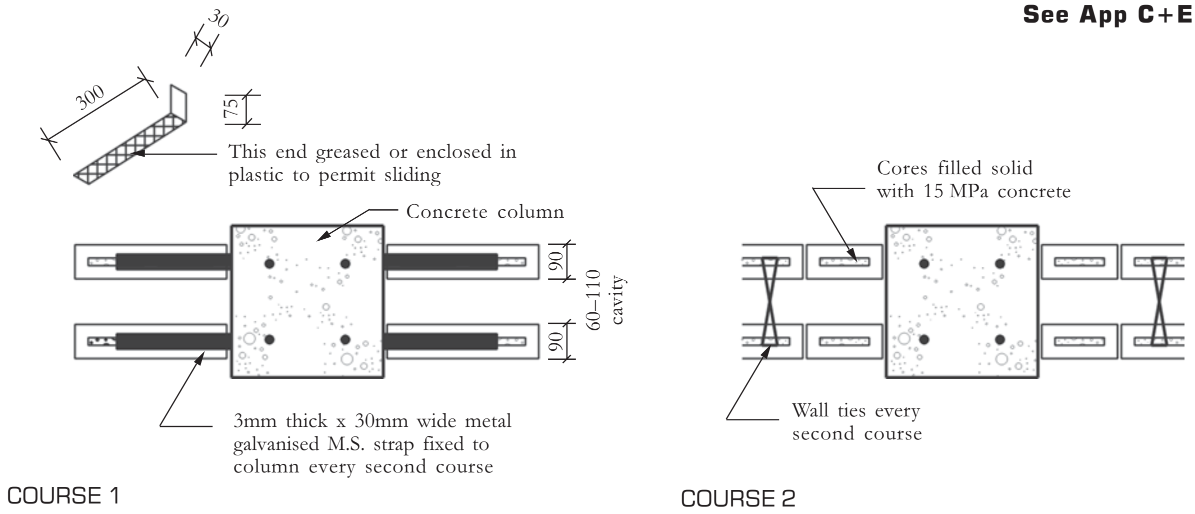
Note:

1. Pilaster blocks provide lateral support while permitting longitudinal movement, provided no metal ties are used between wall and pilaster block.
2. Pilaster block shape adjusted to suit number of intersecting walls and aesthetic considerations.
3. Pilaster blocks may be filled with concrete and reinforced if required.

CONCRETE COLUMN/WALL INTERSECTIONS

C-CC-01

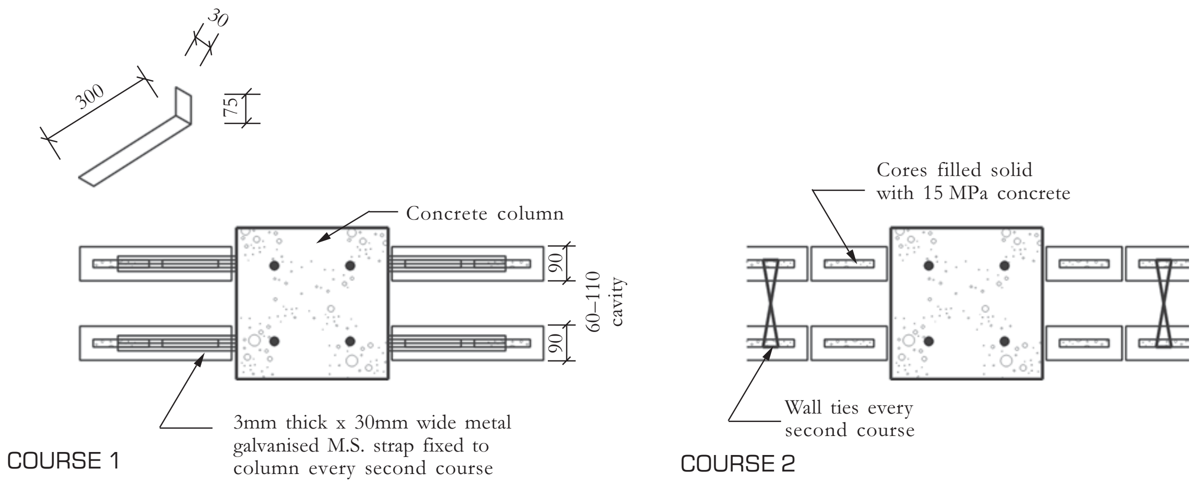
See App C+E



WALL LATERALLY SUPPORTED BY CONCRETE COLUMN, PERMITTING LONGITUDINAL MOVEMENT IN WALL

C-CC-02

See App C+E

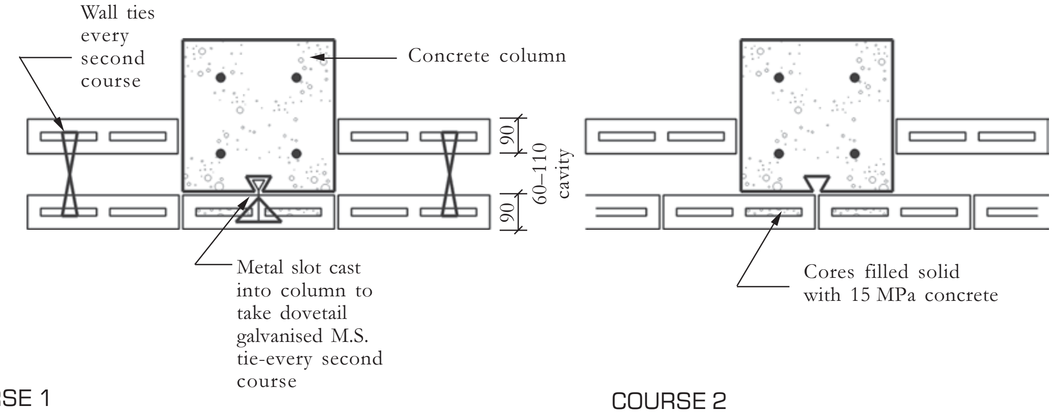


WALL FIXED TO CONCRETE COLUMN

CONCRETE COLUMN/WALL INTERSECTIONS

C-CC-03

See App C



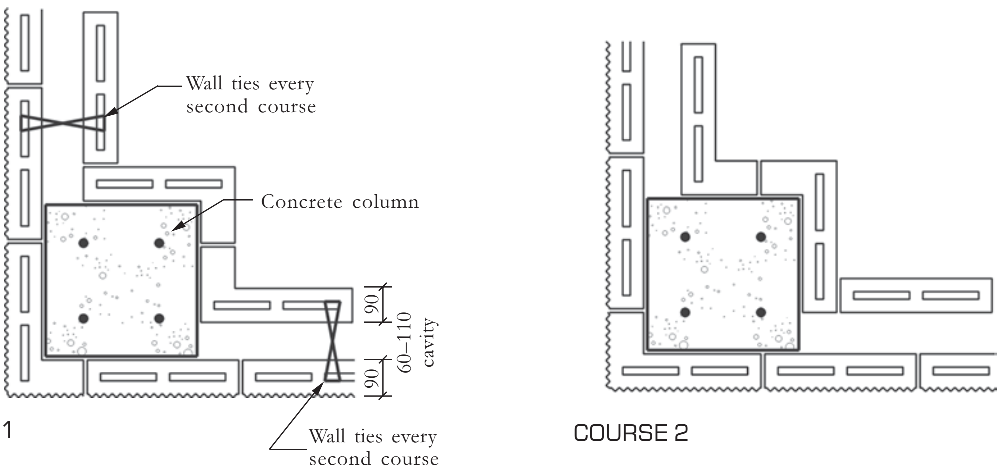
COURSE 1

COURSE 2

WALL LATERALLY SUPPORTED BY CONCRETE COLUMN

C-CC-04

See App C



COURSE 1

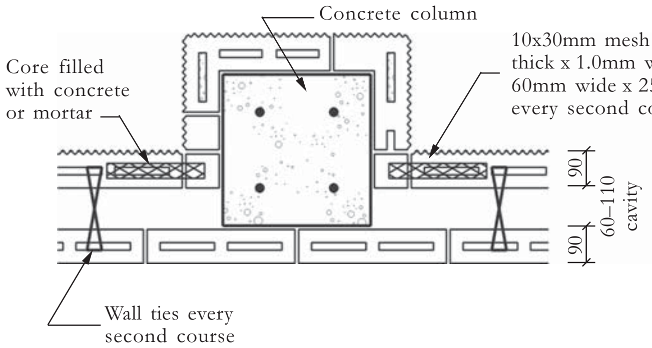
COURSE 2

CONCRETE COLUMN WITH ROCKFACE UNITS

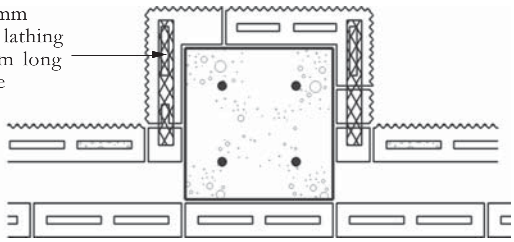
CONCRETE COLUMN/WALL INTERSECTIONS

C-CC-05

See App C



COURSE 1

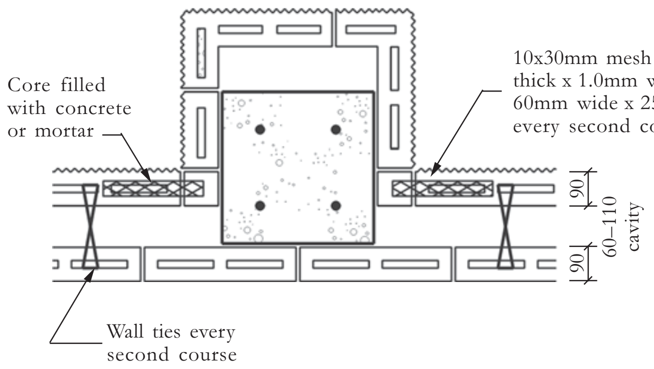


COURSE 2

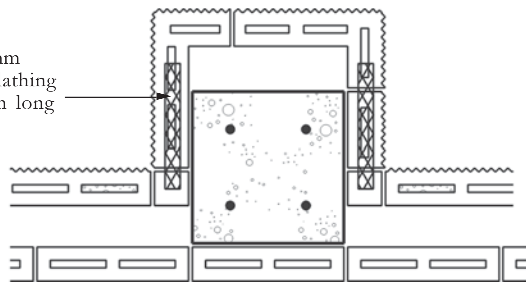
CONCRETE COLUMN BOXED-IN WITH ROCKFACE UNITS

C-CC-06

See App C



COURSE 1



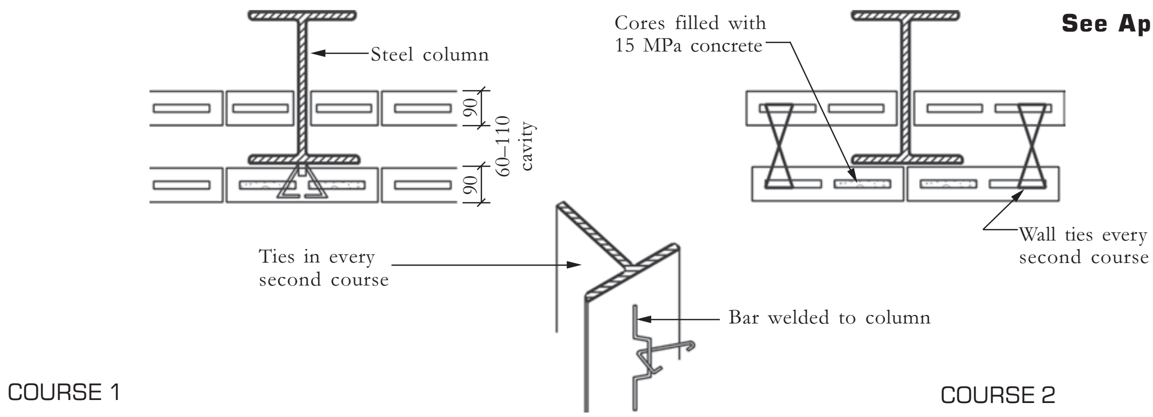
COURSE 2

CONCRETE COLUMN BOXED-IN WITH ROCKFACE UNITS

STEEL COLUMN/WALL INTERSECTIONS

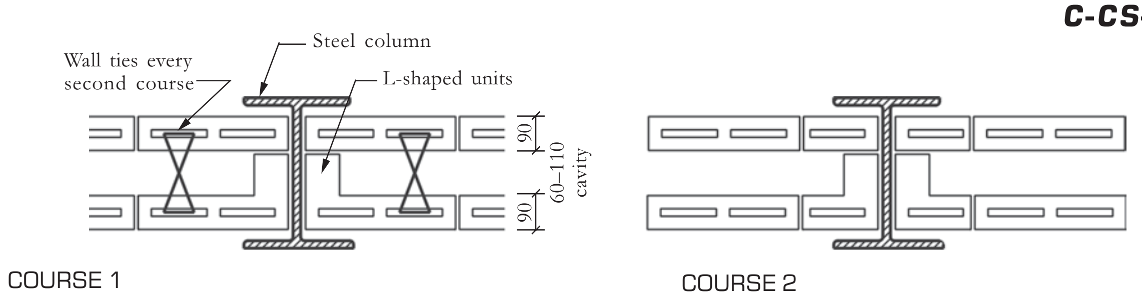
C-CS-01

See App C



WALL LATERALLY SUPPORTED BY STEEL COLUMN

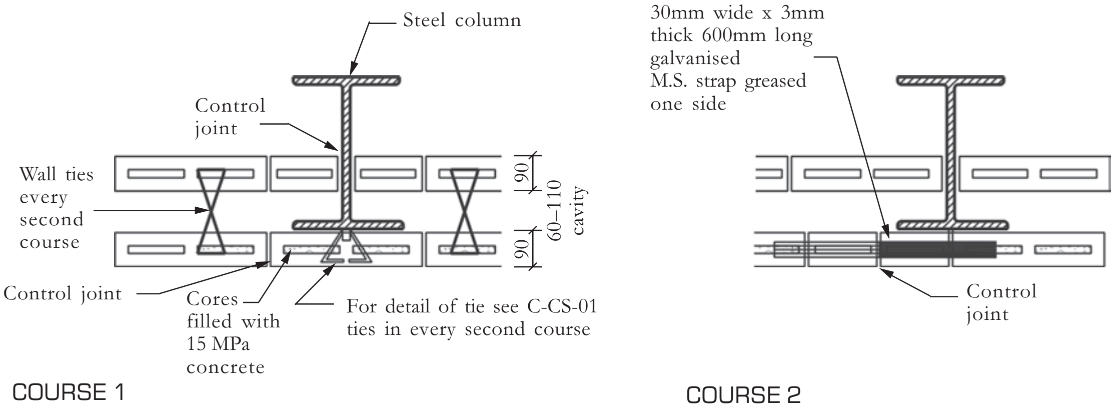
C-CS-02



WALL BUTTING AGAINST STEEL COLUMN

C-CS-03

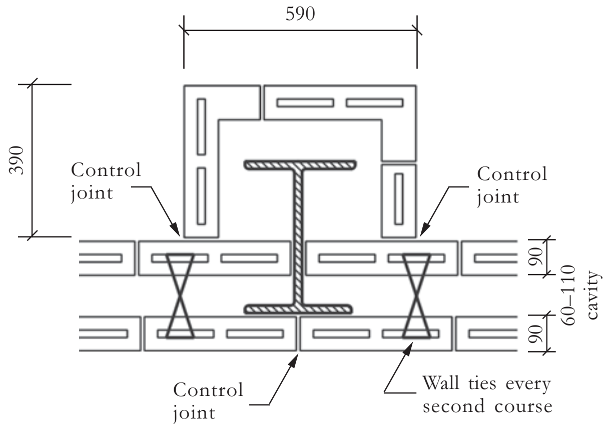
See App C



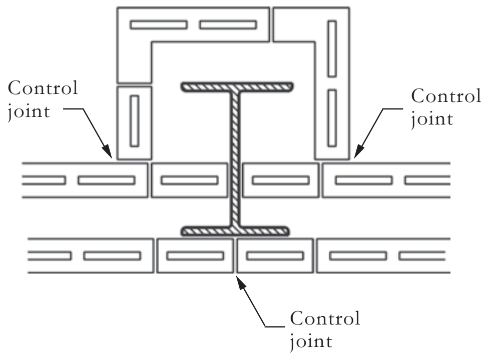
WALL LATERALLY SUPPORTED BY STEEL COLUMN
WITH CONTROL JOINTS

STEEL COLUMN/WALL INTERSECTIONS

C-CS-04



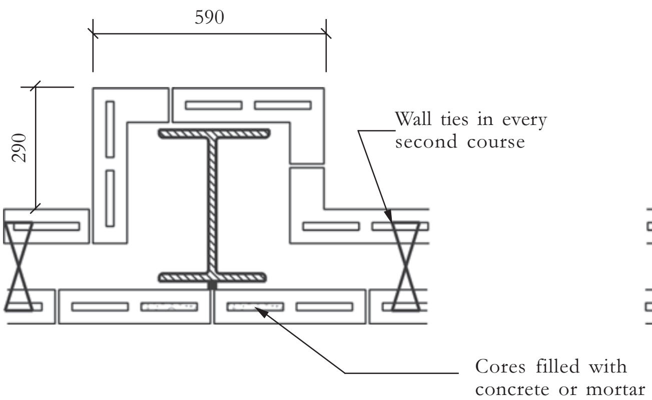
COURSE 1



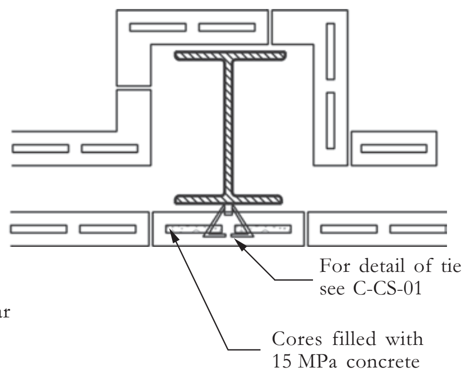
COURSE 2

STEEL COLUMN BOXED IN WITH CONTROL JOINT

C-CS-05



COURSE 1

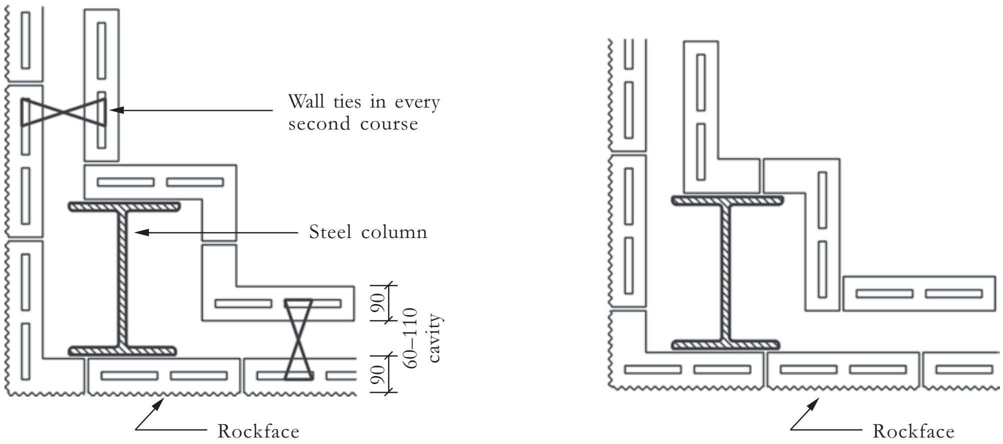


COURSE 2

STEEL COLUMN BUILT IN, PROVIDING LATERAL SUPPORT FOR WALL

STEEL COLUMN/WALL INTERSECTIONS

C-CS-06

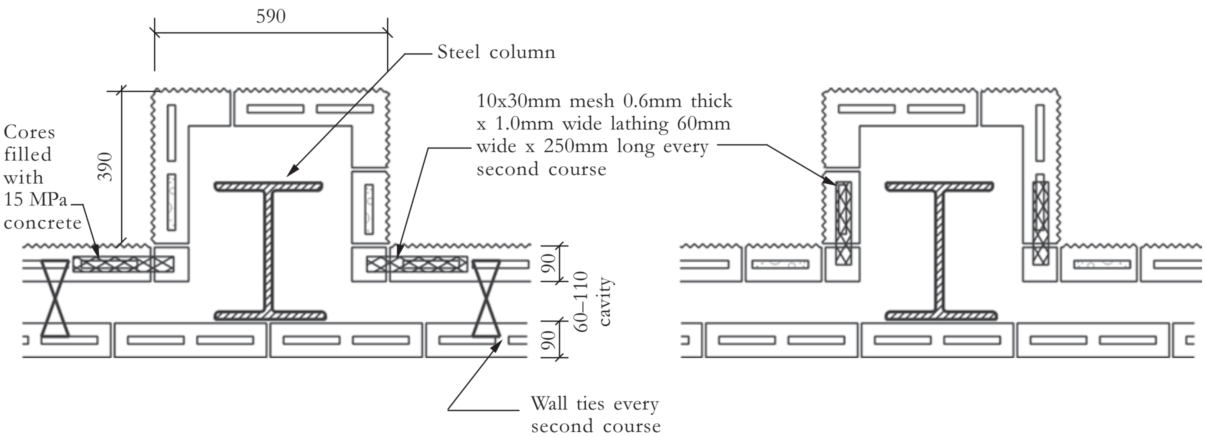


COURSE 1

COURSE 2

STEEL COLUMN BOXED IN WITH ROCKFACE UNITS

C-CS-07



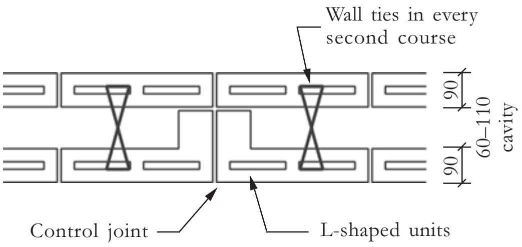
COURSE 1

COURSE 2

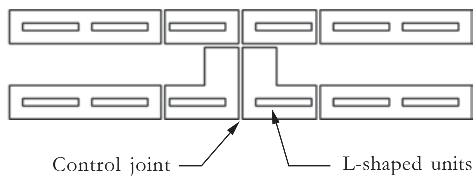
STEEL COLUMN BOXED IN WITH ROCKFACE UNITS

C-CJ-01

See C-CJ-NB 1–4



COURSE 1

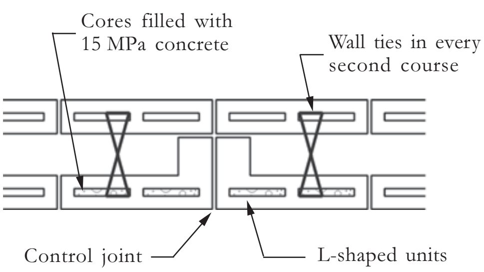


COURSE 2

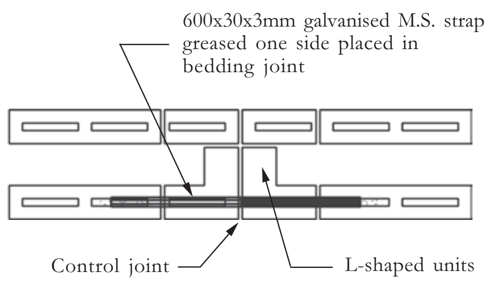
BUTT CONTROL JOINT – PLAIN

C-CJ-02

See C-CJ-NB 1–4



COURSE 1



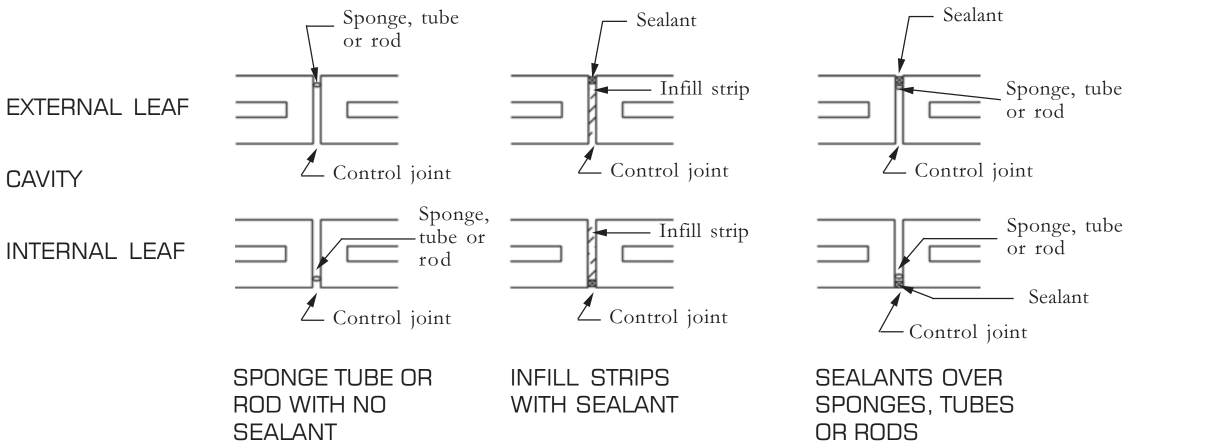
COURSE 2

BUTT CONTROL JOINT WITH STRAP TO GIVE LATERAL SUPPORT

C-CJ-NB1

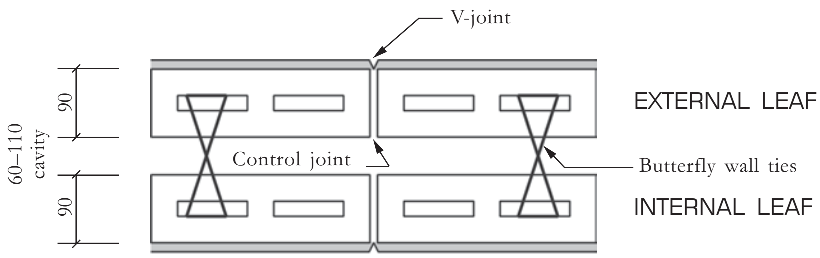
Note:

1. Control joints may be filled with a joint filler such as fibre board, polystyrene or polyurethane strips, sponges, tubes or rods and sealed with sealants such as silicones, polyurethanes, polysulphides, bitumen, acrylic or polyisobutylenes.

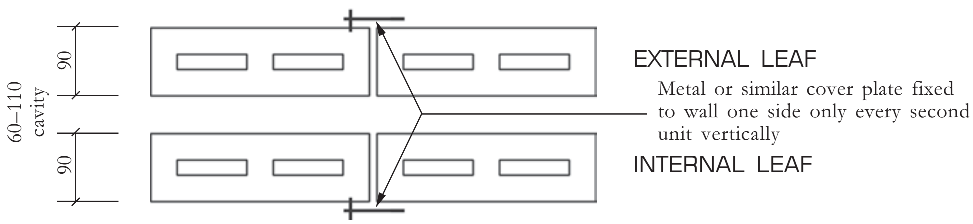


BUTT JOINTS

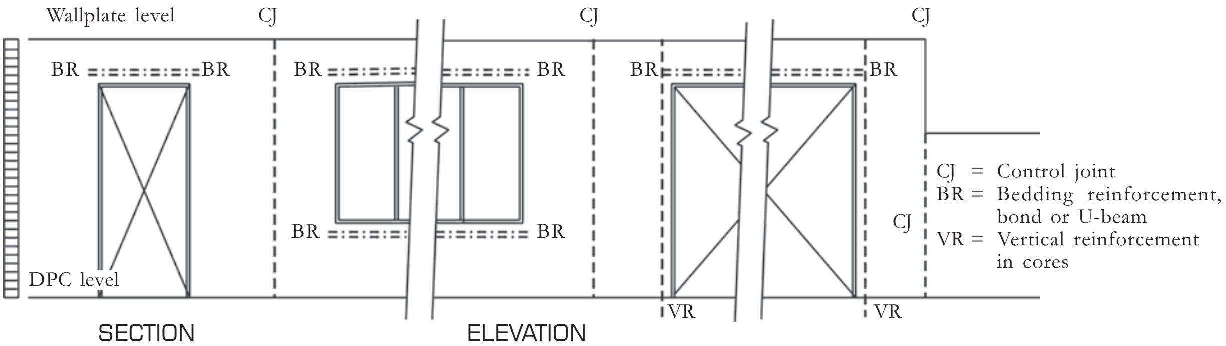
2. If plastered then V-joint is to be cut in plaster over line of control joint.



3. Control joint may be covered by a cover plate.

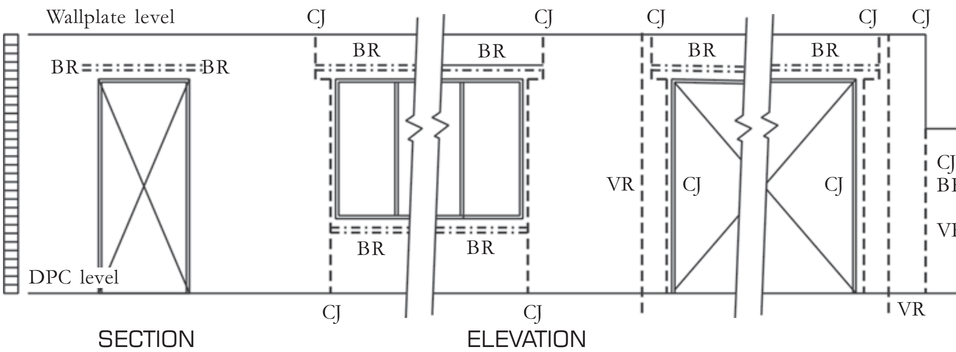


C-CJ-NB2



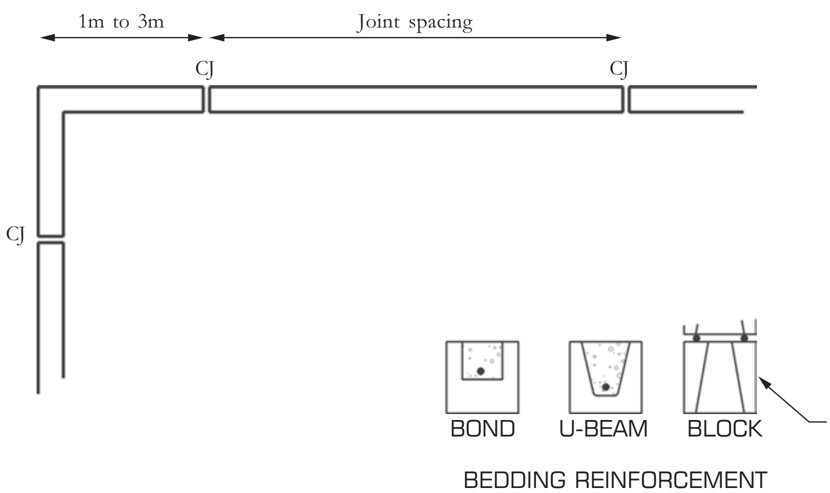
ELEVATION OF WALL SHOWING CONTROL JOINT POSITIONS BETWEEN OPENINGS, HORIZONTAL & VERTICAL REINFORCEMENT

C-CJ-NB3



ELEVATION OF WALL SHOWING CONTROL JOINT POSITIONS AT EDGE OF OPENINGS, HORIZONTAL & VERTICAL REINFORCEMENT

C-CJ-NB4

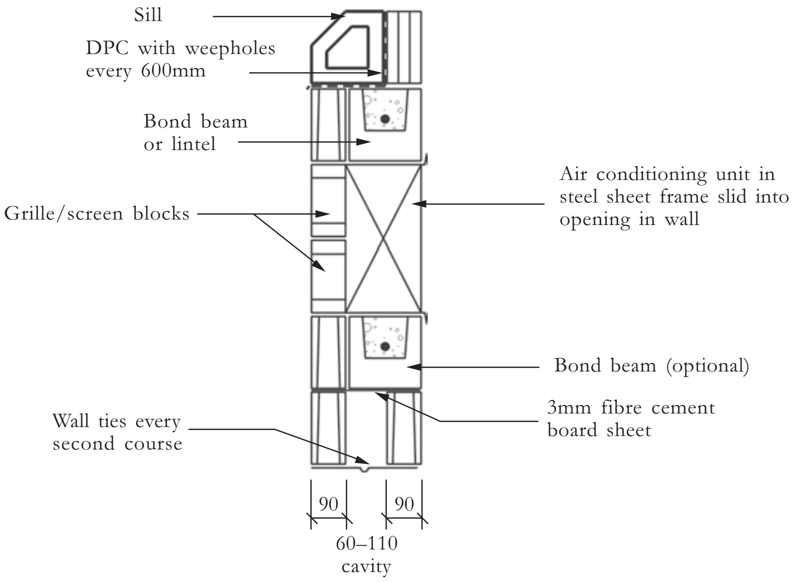


Note:

Control joint spacing not to exceed recommended maximum, i.e. for unreinforced walls 6m, or twice the height of the wall.
For reinforced walls 18m.
Every course reinforced.
For detailed information refer to CMA Masonry Manual and SANS 10145 Concrete Masonry Construction

PLAN OF WALL SHOWING CONTROL JOINT POSITIONS

C-AC-01



AIR CONDITIONING UNIT INSTALLATION

APPENDICES

APPENDIX A DEFINITIONS

Masonry wall means an assemblage of masonry units joined together with mortar or grout. Masonry units may be either solid or hollow, and of brick or block size[1].

Block means any masonry unit having dimensions, which satisfy any one of the following conditions:

a) length between 300mm and 650 mm;

b) width between 130mm and 300 mm; or

c) height between 120mm and 300 mm.

Brick means any masonry unit which is not a block. A masonry unit having dimensions, which satisfy any of the following conditions[1]:

a) length not more than 300 mm;

b) width not more than 130 mm; and

c) height not more than 120 mm.

Hollow masonry unit: A masonry unit containing cavities in excess of 25%, but not exceeding 60%, of the gross volume of the unit[1].

Masonry accessories: These include masonry anchors, connectors and ties other than wall ties; shelf angles and their fixings; wall ties that transmit shear; and bed joint mesh[1].

Masonry unit: A unit of a rectangular shape and that is intended for use in the construction of bonded masonry walling[1].

Solid masonry unit: A masonry unit either containing no cavities or containing cavities not exceeding 25% of the gross volume of the unit[1].

Types of masonry

Prestressed masonry: Masonry in which pre-tensioned or post-tensioned steel is incorporated to enhance resistance to tensile or shear forces[1].

Reinforced masonry: Masonry in which steel reinforcement is incorporated to enhance resistance to tensile, compressive or shear forces[1].

Types of reinforced masonry

Grouted-cavity masonry: Two parallel single-leaf walls spaced at least 50 mm apart, effectively tied together with wall ties. The intervening cavity contains steel reinforcement and is so filled with infill concrete or grout as to result in common action with the masonry under load[1].

Reinforced hollow blockwork: Hollow blockwork that is reinforced horizontally or vertically (or both) and subsequently wholly or partly filled with concrete[1].

1 SANS 10164-2 (See Appendix B)

APPENDIX B REFERENCES

STANDARDS ON THE USE OF CONCRETE MASONRY

MANUFACTURE OF CONCRETE MASONRY UNITS

SANS 1215 – 1984 (2002) Concrete masonry units

USE OF MASONRY UNITS

Planning, design and specifications

SANS 993-1972 (2002)
Modular coordination in building

SANS 10021-2002
Waterproofing of buildings

SANS 10155-1980 (2000)
Accuracy in buildings

NBRI R/Bou – 602
Fire resistance ratings – walls constructed of concrete blocks

National Building Regulations

National Building Regulations and Building Standards Act 1977 revised 1990

SANS10400-1990
Application of the National Building Regulations

SANS10401-1989
The construction of dwelling houses in accordance with the National Building Regulations

Structural Design

SANS 10100- 1:2000
The structural use of concrete
Part 1: Concrete

SANS 10160 -1989
The general procedures and loadings to be adopted for the design of buildings.

SANS 10161-1980
The design of foundations for buildings

SANS 10164
The structural use of masonry
Part 1-1980 (2000): Unreinforced masonry
Part 2-2003: Reinforced and prestressed walling

SANS 1504 -1990 (2002): Prestressed concrete lintels

Concrete Masonry Construction

SANS 10073-1974
Safe application of masonry-type facings to buildings

SANS 10145-2000
Concrete masonry construction

SANS 10155-1980
Accuracy in buildings

SANS 10249-1990
Masonry walling

MATERIALS OF CONSTRUCTION

Aggregates

SANS 794- 2002
Aggregates of low density

SANS 1083- 2002
Aggregates from natural sources

Cement

SANS 50197-1:2000
Cement – Composition, specifications and conformity criteria
Part 1: Common cements

SANS 50413-1:2004
Masonry cement
Part 1: Specification

Dampproof courses

SANS 248-1973 (2000)
Bituminous dampproof course

SANS 298-1975 (1999)
Mastic asphalt for dampproof courses and tanking

SANS 952-1985 (2000)
Polyolefin film for dampproofing and waterproofing in buildings

Reinforcement

SANS 190-2:1984 (2001)
Expanded metal building products

SANS 920-1985 (2000)
Steel bars for concrete reinforcement

SANS 1024-1991
Welded steel fabric for reinforcement of concrete

Lime

SANS 523- 2002
Limes for use in building

Sand

SANS 1090- 2002
Sand for plaster and mortar

USEFUL BRITISH STANDARDS

BS EN 12878- (1999)
Pigments for portland cement and portland cement products

BS 4551-1998
Methods of testing mortars, screeds and plasters

BS 4887
Mortar admixtures

Part 1: 1986:	Specification for air-entraining (plasticizing) admixtures
Part 2: 1987:	Specification for set retarding admixtures

BS 5224- 1976
Specification for masonry cement

BS 6477-1984
Water repellents for masonry surfaces

CONCRETE MANUFACTURERS ASSOCIATION PUBLICATIONS

Masonry Manual	7th edition, Johannesburg 2005	
Free-standing walls	Design guide	
	Technical note:	Unreinforced
		Reinforced

APPENDIX C ANCHORS – WALLS

Anchors are used for tying metal straps, angles and wall accessories to masonry, concrete or steel, at wall/concrete, wall/wall, wall/steel intersections, or to support a leaf of a wall or service. Anchors function by being held in position in the base material by friction, keying, bonding or a combination of these factors. Essentially the fixing of anchors to any member requires either the drilling of a hole to house the anchor, or the firing of the anchor into the supporting material.

In general terms shot-firing anchors into brittle material such as concrete or masonry may shatter the material and the quality of support may then become suspect. Drilling is preferable where anchorage stress level is significant.

Firing into ductile materials such as steel or timber is an easy and quick method of anchoring.

In both cases the amount of force exerted in drilling or shot firing should not disturb the bonding of masonry units to adjacent units.

The position of the anchor is important in ensuring optimum load carrying capacity.

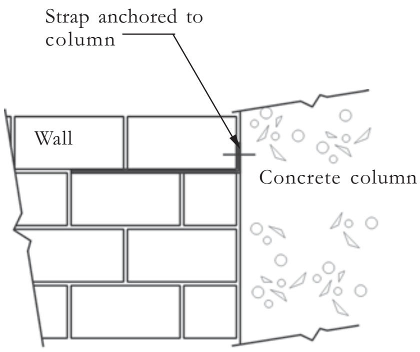
In the case of angles supporting a non-structural outer leaf of a wall to the main structure then the position of the hole in the vertical leg of the angle should be as near the top of the angle as possible. It is also preferable to use an unequal angle with the longer leg of the angle in the vertical direction.

With straps holding walls to columns to provide lateral support, the anchor should be placed as near as possible to the right angle bend in the strap. This is to prevent the straightening out of the bend, with, say, shrinkage of the wall, which would tend to lift the masonry unit above the horizontal section of the strap, opening the bedding joint.

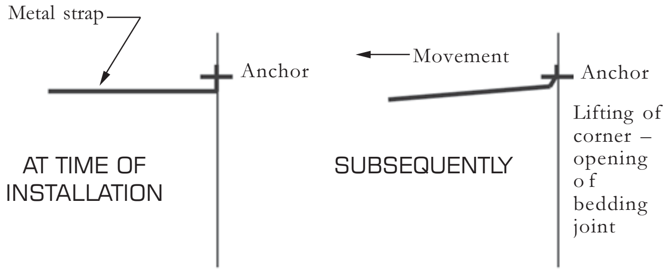
Normally a single anchor in the vertical leg of the strap is adequate but if two anchors are necessary then the spacing of these anchors should be such as not to reduce the overall anchorage. When shot firing into brittle materials the spacing should be at least 100 mm.

Heated drawn steel should be used for straps that are bent and twisted. Normally stainless steel cannot be shaped to the required shape.

The type, size and position of anchorage to be shown on drawings and/or clearly specified.



TYPICAL SECTIONAL ELEVATION STRAP FIXED TO COLUMN



DIAGRAMATIC SKETCH OF STRAP MOVEMENT WITH MASONRY SHRINKING AWAY FROM COLUMN

APPENDIX D ROOFING FIXING

Types of Anchor (refer SANS 10400)

Roof Slope, Degrees	Max Roof Truss, Rafter or Beam spacing, mm	Type of anchor required	
		Light Roof	**Heavy Roof**
Less than 15	760 1050 1400	A,B or C B or C C	Not Applicable
15-30	760 1050 1400	A, B or C B or C C	Type A for all applications
Greater than 30	Any	A,B or C	

Anchors

Type A: 2 Strands 4 mm Galvanised Steel Wire
Type B: 30 mm x 1.2 mm Galvanised Steel Strap
Type C: 30 mm x 1.6 mm Galvanised Steel Strap

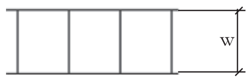
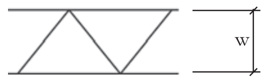
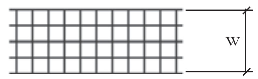
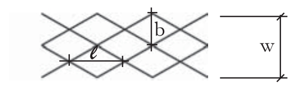
Length of Anchorage	Type of Roof
300 mm	Heavy roof (Concrete or clay tiles or slate)
600 mm	Sheeted Roof

Note:

Details of types of anchors apply to buildings not exceeding two storeys in height and where span of the roof truss does not exceed 10 m.

APPENDIX E: TIES, STRAP AND BEDDING REINFORCEMENT

DETAILS OF REINFORCEMENT USED IN BEDDING JOINTS

Type	**Ladder Type**	**Truss Type**	**Mesh/Lathing for reinforcement and tying intersecting leaves of wall**	
Description	Two longitudinal wires with transverse wires	Two longitudinal wires with diagonal transverse wires.	Rectangular wire grid	Diagonal flat expanded metal with diamond shape openings
Sketch				
Width (w), mm	75/150/230	60/110/160	50/150	65/75/125
Diameter of wire, mm	2,5/2,8/3,15/3,55	3,25/3,55	3,15	0,8 mm thick plate
Wire spacing (s), mm			50	
Size of opening b x ℓ,mm				10 x 30
Length rolls, m	20/25		25	100
Length flats, m	3	3	3	Cut to 250 mm
Size of sheet, m x m				1,2 x 2,4
Note:	Wire manufactured for bedding joint reinforcement from high tensile steel should preferably be flat i.e. not in rolls.	Only available flat	Dimension and properties to be confirmed with local supplier	Dimensions and properties to be confirmed with local supplier. Consider stronger ties if lateral load transfer is significant
Check availability and quality. For quality, check if commercial or stated quality, whether mild, galvanised or stainless steel, or coated for corrosion resistance.				

DETAILS OF STRAPS, TIES AND REINFORCEMENT

	Hoop Iron		Straps	Rods/Bars	Wall Ties
Purpose	Anchoring roof trusses to walls	Wall to wall sliding joints (Concertina strap) 	– Anchoring – concrete and steel columns to walls – Anchoring walls to walls/sliding joint – wall to wall sliding joints	Reinforcement of: – bedding joint – hollow unit core – cavity Bars can be used in place of straps for anchorage.	Connecting two leaves of a cavity wall to ensure that the wall acts as a unit in resisting applied loads. – In multileaf walls ensures monolithic action – In diaphragm walls provides shear transfer between web and flange
Material	Normally cut from off cuts of rolls of sheet steel – regarded as commercial quality		Normally cut from flat steel sheets – regarded as stated quality	Mild steel or high tensile steel. May be stainless steel or coated for corrosion resistance	Material determined by the likelihood of corrosion viz. galvanised mild steel, copper, copper-zinc or austenitic stainless steel
Shape	Flat	Concertina at joint	Flat	Round, smooth, deformed or indented	Of various shapes
Thickness, mm	1,2/1,6	1,2/1,6	2,5/3,0		1,5 4,0
Width, mm	30	25 30 40	30 40		13 20
Diameter, mm				6<Ø<32	2,8 3,15 4,0 4,5
Fixing	One end of strap embedded in concrete in core of unit or in bedding joint mortar, other end fixed to roof truss or wall plate. See Appendix D.	Both ends embedded in mortar joint	One end of strap embedded in concrete in core of unit, or in bedding joint mortar, other end fixed by shot-firing bolts/pins into steel or drilling and bolting into concrete For sliding joints, one end greased	Placed in – bedding joint – core hollow unit, – bond and U-beams, – cavity walls and filled with mortar or infill concrete	Placed in bedding mortar General requirements for provision of ties Size of cavity / Ties/m² <75 mm / 2,5 75 – 100 mm / 3 100 – 150 mm / 5

Check material providing connection between structural masonry elements can safely transfer loads and forces while providing lateral support.

APPENDIX F DETAILING PRACTICE FOR REINFORCED MASONRY

R B Watermeyer Pr. Eng. B Sc Eng, MSAICE, MSAConsE Soderlund & Schutte Inc.

1. INTRODUCTION

Drawings depicting details of reinforcement in masonry elements, supplemented by specifications are required to translate designs into physical realities. Detailing is therefore the most important link between good design and quality construction. Accordingly detailing of reinforcement should be kept simple, clear and practical while drawings should clearly define and depict the design requirements in a comprehensible manner. SANS 10164-2 offers guidance in this regard, the main provisions of which are highlighted and illustrated hereunder.

Reinforcement should be located to suit simple masonry bonding patterns. Cutting of masonry units should be kept to a minimum while the bonding of masonry should be such that an adequate void for grouting is maintained. Common practical bonding arrangements are illustrated below.

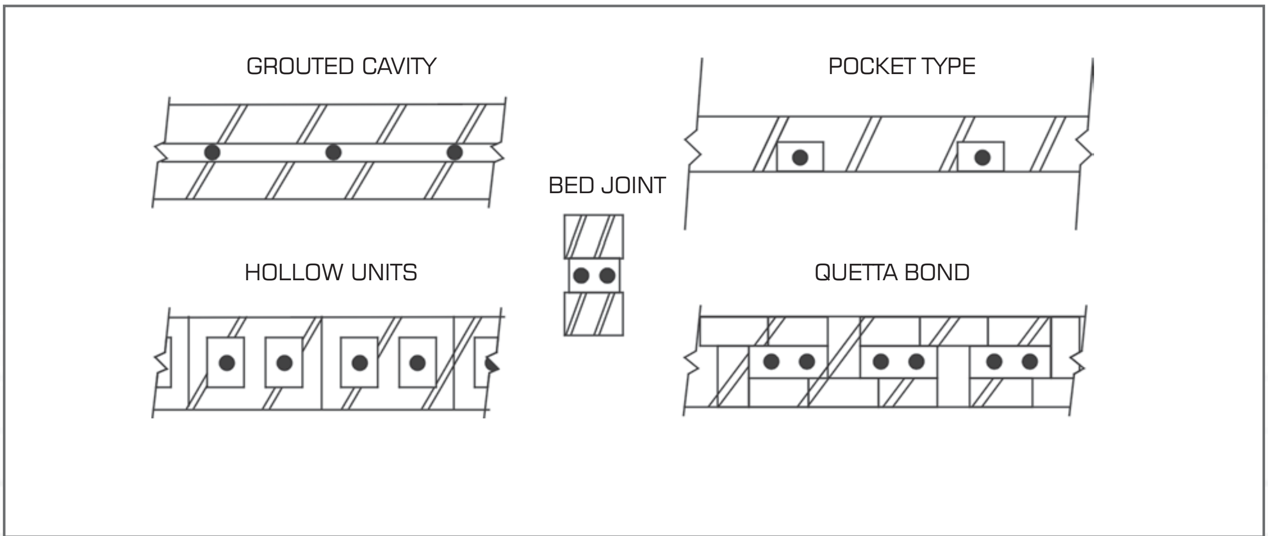
The detailing of reinforced masonry differs somewhat to that of reinforced concrete; the principle differences being:

- distribution steel is not required in certain masonry bonding patterns since bonded masonry can often span and distribute forces between reinforcing bars.
- reinforcing bars often have to be protected against corrosion in reinforced masonry applications where mortar infill is employed.
- the characteristic anchorage bond strength between mortar and steel is significantly less than that between concrete and steel.

2. MORTAR AND CONCRETE INFILL (SANS 10164-2)

Only Class I and Class II mortar (refer to SANS 10164-1) should be used in the bedding course for reinforced masonry applications. Where masonry cement is used, the bond between steel and mortar should be investigated.

Infill concrete should be grade 25 concrete or better. Mixes should have adequate workability with a slump of between 75 and 175mm. The nominal aggregate in such concrete should be at least 5 mm less than the permitted cover to any reinforcement.



3. DETAILING RULES (SANS 10164-2)

3.1 Main and secondary reinforcement

The main provisions of SANS 10164-2 which relate to the manner in which steel is located in reinforced elements in summarised in Table 1.

Table 1: Detailing of main and secondary reinforcement

LOCATION OF STEEL WITHIN ELEMENT	MAXIMUM BAR SIZE mm	SECONDARY REINFORCEMENT+	MAXIMUM BAR SPACING mm	SPECIAL PROVISIONS
Grouted cavity	25	$A_s > \frac{0,05\ bd}{100}$	500	Low lift construction Provide ties in accordance with SANS 10164-1 High lift construction Provide purpose made ties in accordance with Appendix A of SANS 10164-2
Pockets	32	Not required#	No upper limit	Only one bar may be used if pocket is less than 125 mm x 125 mm
Quetta bond	25	$A_s > \frac{0,05\ bd}{100}$	500	Only one bar may be used if core is less than 125 mm x 125 mm
Cores of hollow units	25	$A_s > \frac{0,5\ bd}{100}$	500	Only one bar may be used if core is less than 125 mm x 125 mm
Bed joints	6#	Not applicable	Not applicable	Wall has enhanced lateral resistance if $A_s > 14 mm^2$ is provided at vertical centres $\ngtr$ 450 mm

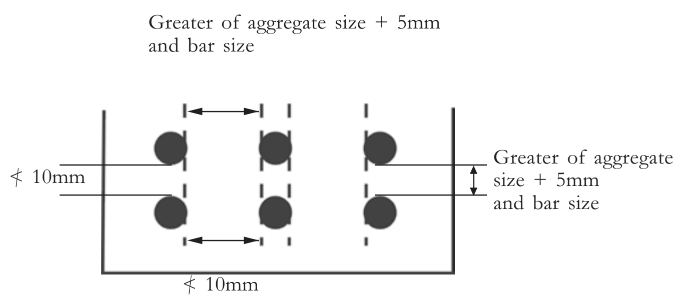
* Prestraightened hard drawn wire with a minimum proof stress of 485 N/mm^2 as supplied by a manufacturer of welded steel fabric reinforcement is suitable for such reinforcement. (Standard bar diameters are 3,55;4 and 5,6);

+ b = breadth of section; d = depth to neutral axis. A_s = cross sectional area of reinforcement.

Distribution steel is not required since bonded masonry, particularly in the horizontal direction, can span and distribute forces between reinforcing bars. However, distribution steel may be required to control shrinkage.

Usually reinforcement acts in tension. However, where reinforcement acts in compression, such reinforcement must be restrained against the tendency to buckle. This achieved by the inclusion of secondary steel reinforcement in the form of distribution steel, links or binders.

In all cases, the minimum clear horizontal or vertical distance between parallel bars should be as follows:



1.2 Anchorage bond, laps and joints

For reinforcement to develop the design stress, it must be adequately bonded into the surrounding masonry. This may be achieved by ensuring that:

- the cover of concrete or mortar infill is at least equal to the bar diameter; and
- a sufficient length of bar (anchorage length) extends beyond any section to develop the necessary force at that section.

The length of bar required for anchorage purposes (l_{ba}) may be calculated as follows:

$$l_{ba} = \frac{f_y \, \gamma_{mb} \, \varnothing}{4 \, \gamma_{ms} \, f_b} = K \, \varnothing$$

where:

$\varnothing$ = nominal bar diameter

γ_{mb} = partial safety factor for bond strength

γ_{ms} = partial safety factor for strength of steel

f_b = characteristic anchorage bond strength

f_y = characteristic tensile strength of reinforcing steel

A_s = cross sectional area of steel

K = ratio of anchorage bond length to bar diameter (see Table 2)

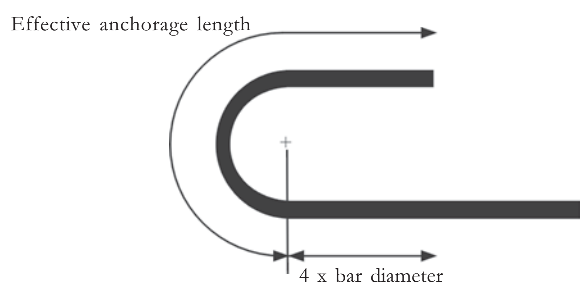
$$\text{Thus } l_{ba\ required} = K \, \varnothing \, \frac{A_{s\ required}}{A_{s\ provided}}$$

Table 2: Ratio of anchorage bond length to bar diameter

TYPE OF REINFORCEMENT	CHARACTERISTIC TENSILE STRENGTH MPa	RATIO OF ANCHORAGE BOND LENGTH TO BAR DIAMETER (K)*			
		Mortar Infill		Concrete Infill	
		Tension	Compression	Tension	Compression
Hot rolled mild steel plain bar as in SANS 920	250	51	42	42	35
Hot rolled high yield deformed bar as in SANS 920	450	68	57	55	45
Hard drawn steel wire as in SANS 1024	485	98	82	82	68
Stainless steel grades 304515, 316531 and 316533 as in BS 970-1	460	93	77	78	65
– plain bar – deformed bar		70	58	56	46

The effective anchorage length of a hook or bend, measured from the start of the bend to a point four times the bar size beyond the end of the bend should be taken as the lesser of:

- 24 times the bar size.
- 8 times the internal radius of a hook.
- 4 times the internal radius of a 90 degree bend.

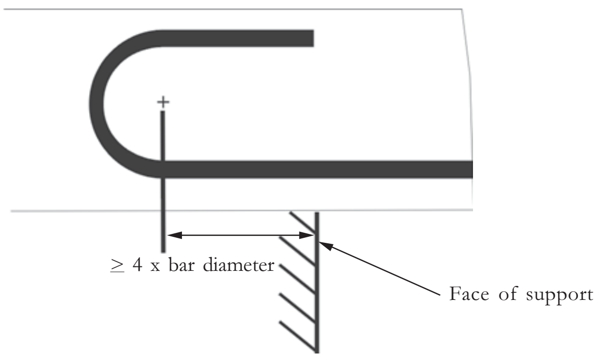


Note: *Minimum radius of any bend*

= 2 Ø (mild steel)

= 3 Ø (high yield steel)

The beginning of hooks should be located inside the face of support as follows:

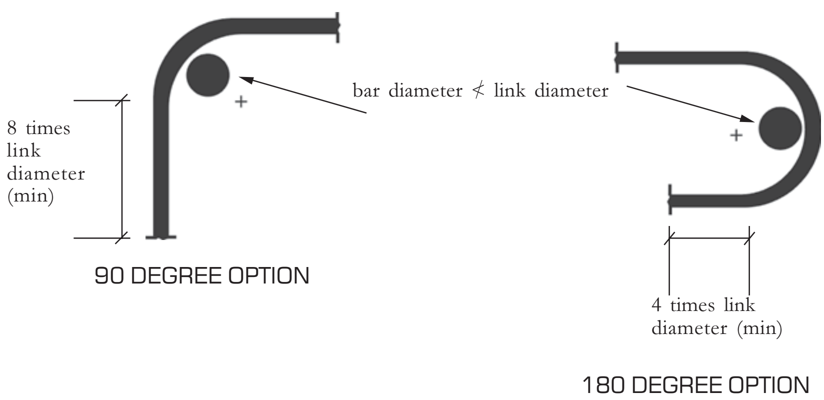


Joints in reinforcement may be achieved by means of mechanical couplers or simply by lapping reinforcing bars of follows:

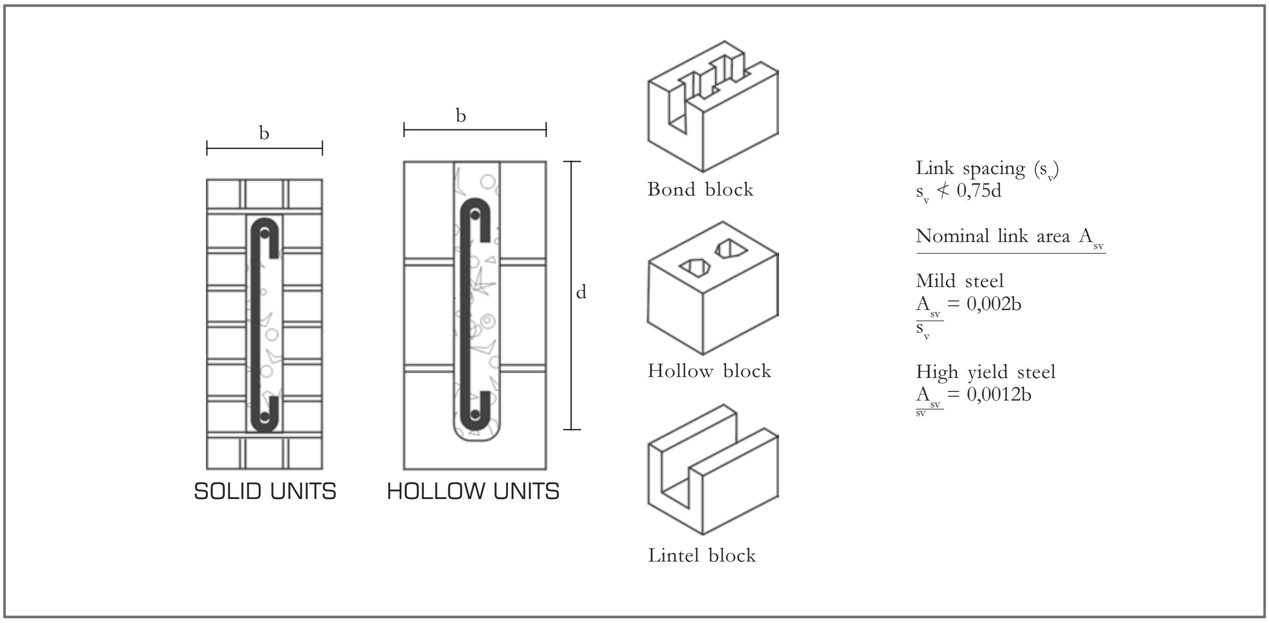
Generally, laps should be located away from areas of high stress and should be staggered. Account of the construction sequence, build-ability, stress considerations, congestion of reinforcement etc., should be taken in the location of laps and joints.

1.3 Links

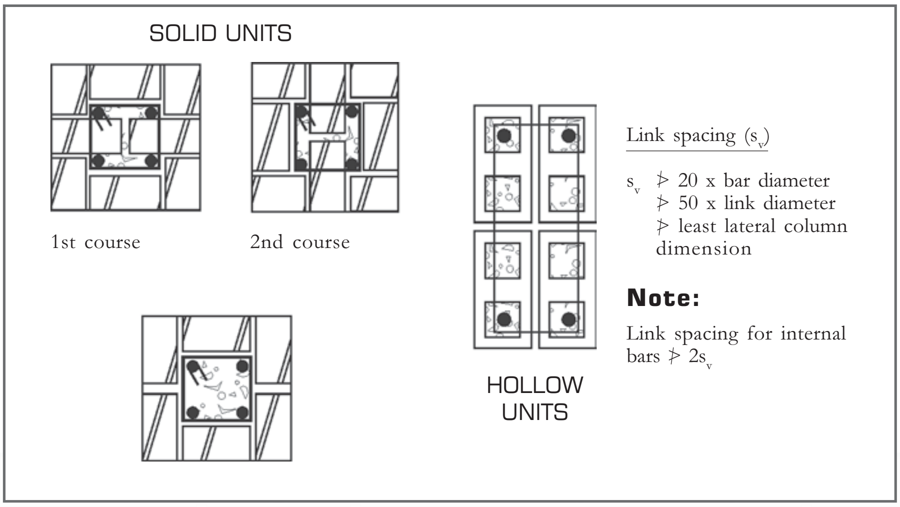
Links may be required to restrain reinforcement acting in compression or to provide shear reinforcement. Links may only be considered to be fully anchored if they are detailed as follows:



Shear reinforcement links in beams should be provided as follows:

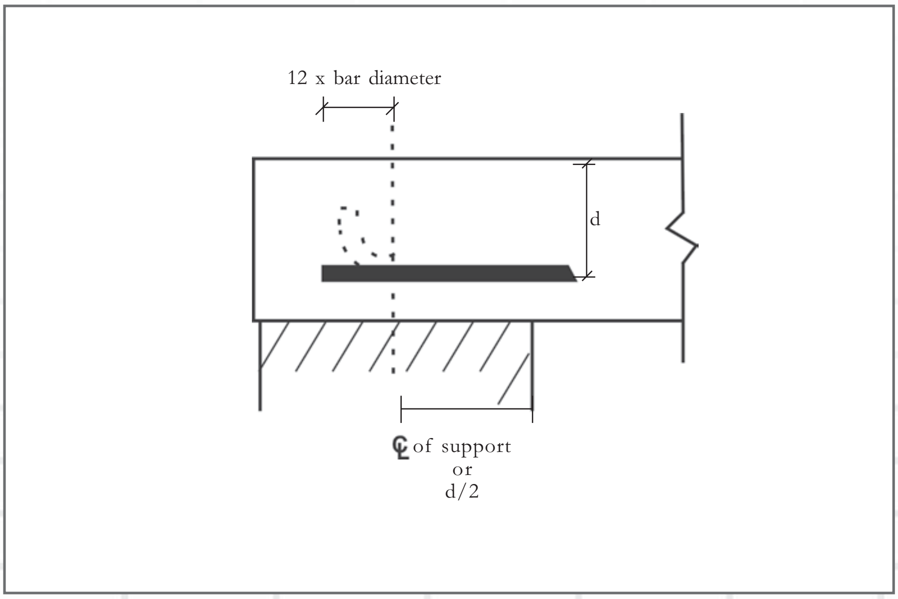


Where compression steel is used in beams, links should be provided as for columns. Column links are required when the area of steel exceeds 0,25% of the gross area of the column and the design load exceeds 25% of the resistance capacity of the column. In such circumstances, links should be proved as follows:

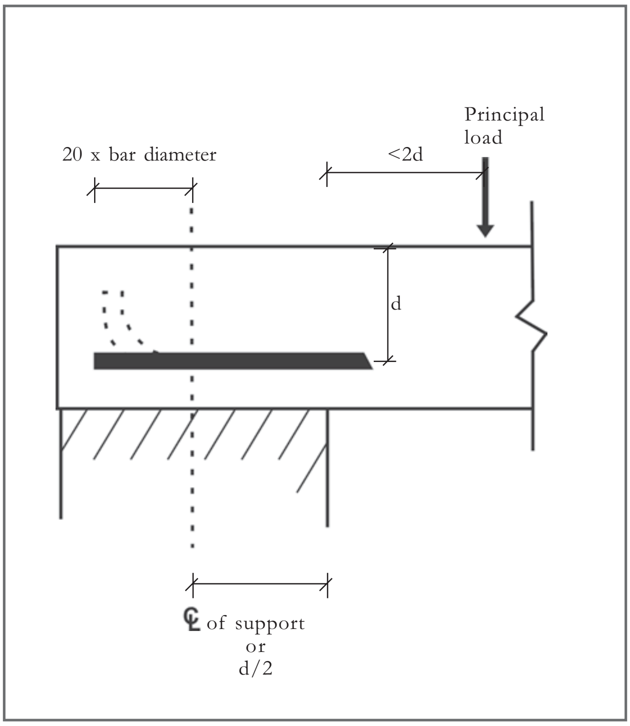


3.4 *Curtailment of bars*

Reinforcing bars acting in tension at simply supported ends of members should be terminated as follows:



However, should the distance between the face of the support and the edge of the nearest principal load be less than twice the effective depth, reinforcement should be curtailed as follows:



Reinforcing bars which are subjected to bending and terminate other than at an end support, should continue for a distance beyond the point at which they are no longer required, equal to the greater of the effective depth of the member or12 times the bar size, provided, however, that one or more of the following is satisfied:

- bars extend for a distance at least equal to the effective anchorage bond length;
- the design shear strength of the section is at least twice that of the applied shear force;
- the remaining reinforcement provides at least twice the area of reinforcement required to resist the applied bending moment.

4. RESISTANCE OF METAL COMPONENTS TO CORROSION (SANS 10164-2)

4.1 General

The resistance of metal components to corrosion depends upon the following:

- exposure environment
- type and quality of cementitious surround, i.e., mortar or infill concrete
- cover
- type of protective coating of steel.

Table 3: Classification of exposure conditions

EXPOSURE CLASSIFICATION	EXPOSURE ENVIRONMENTS FOR SURFACES OF REINFORCED MEMBERS
E1	Protected by an impermeable membrane Exposed to the elements in ■ inland areas as shown in Figure 1. ■ interiors of buildings. Beneath coatings that resist moisture penetration.
E2	Exposed to the elements in: ■ inland areas as shown in Figure 1. ■ interiors of industrial buildings where humidity is high or where repeatedly washed. Submerged in non-aggressive soils.
E3	Exposed to the elements in: ■ areas within 3 km of industries that discharge atmospheric pollutants. ■ areas within 1 km of the coastline or shoreline of large expanses of salt water. Submerged in fresh water.
S	Submerged in aggressive soils. Submerged in sea water, running water or soft water. In contact with corrosive liquids or gas.

SANS 10164-2 contains recommendations regarding the minimum levels of protective coatings for reinforcement and masonry accessories used in various types of construction and exposure conditions. These recommendations are not necessarily the desirable levels of protection that may be required since local conditions or specific circumstances may warrant a higher degree of protection.

4.2 Exposure classification

The exposure classification may be established from Table 3 and Figure 1 or Table 17 of SANS 10164-2. Elements which may be subjected to more severe exposure than the remainder of a building, such as parapets, chimneys and sills should be regarded as being located in an environment classified as E3.

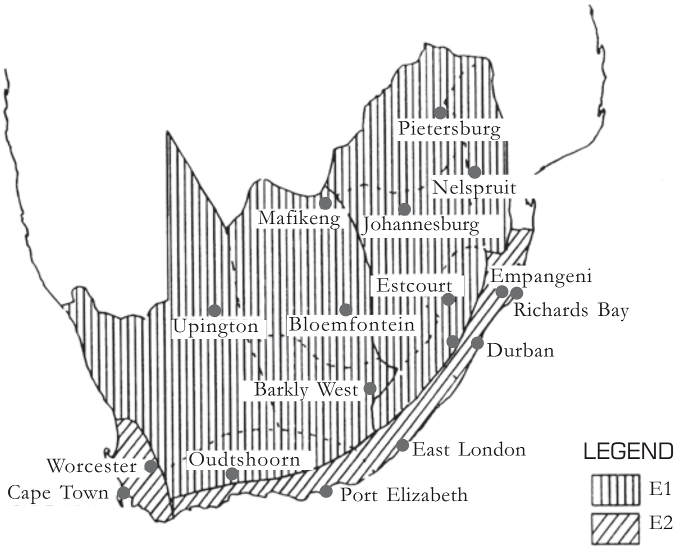


FIGURE 1: EXPOSURE ENVIRONMENTS

4.3 Corrosion protection

The degree and type of corrosion protection required, if any, for various types of steel should be determined in accordance with Table 4, read in conjunction with Table 5. The zinc coating on galvanised steel ties should be at least equal to that in Table 2 of SANS 935 for normal environments and 470 g/m^2 for highly corrosive environments.

Table 4 : Corrosion-resistance rating for steel in masonry

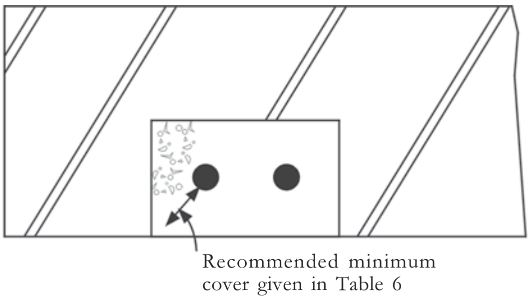
CORROSION-RESISTANCE RATING	TYPE, OR COATING, OF STEEL (OR BOTH)
C1	Uncoated carbon steel; or steel whose coating is less than required for C2 rating.
C2	Galvanized steel; for products made from: a) sheet steel – the coating class shall be at least Z 275 as in SANS 934; b) wire of circular cross-section up to 6,0 mm diameter – the coating shall be as for class A wire in Table 2 of SANS 935; c) other forms of steel – the coating mass shall be as in Table 1 of SANS 763.
C3	Galvanized steel; for products made from: a) sheet – the coating class shall be at least Z 600 as in SANS 934. b) other forms of steel – the coating shall be as for rating C2.
C4	Steel, or steel coating, whose type and thickness are specially selected to withstand the particular corrosive conditions to which that steel and its masonry may be exposed.

Table 5: Selection of reinforcement for durability

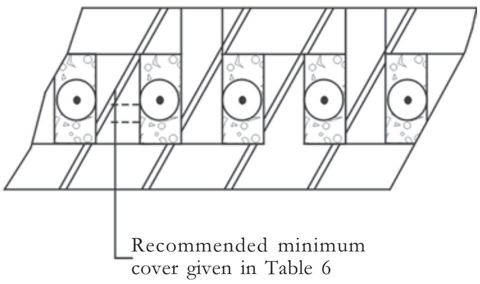
LOCATION OF REINFORCEMENT CLASSIFICATION	EXPOSURE RESISTANCE	CORROSION
Located in grouted cavities or in Quetta bond construction a) where concrete infill employed b) where mortar infill is employed	 E1, E2 and E3 S E1 E2 and E3 S	 C1 or higher C4 C1 C2 or higher C4
In bed joints	E1 E2 E3 S	C1 or higher C2 or higher C3 C4

4.4 Cover

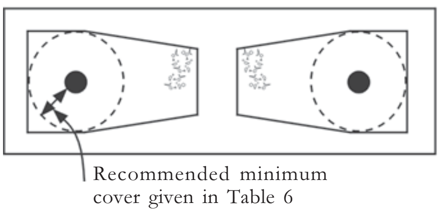
Cover to reinforcement should be as follows:



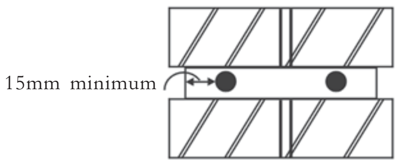
POCKET TYPE



QUETTA BOND



HOLLOW UNITS



BED JOINT

Table 6: Minimum concrete cover for carbon steel reinforcement

EXPOSURE CONDITION	MINIMUM THICKNESS OF CONCRETE COVER, mm			
	Concrete grade (as in SANS 10100)			
	25	30	35	40
	Minimum cement content kg/m^3			
	250	300	350	350
E1	20	20	20	20
E2	–	30	30	25
E3	–	40	35	30
S	–	–	–	60

The tooling of mortar joints gives a dense, water-shedding finish. Tooling of joints should be undertaken in elements located in environments which are classified as E3 or S.

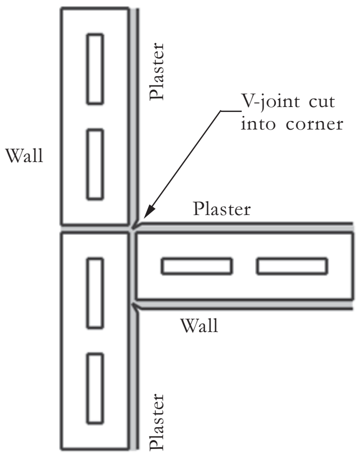
5. *FIRE RESISTANCE*

SANS 10164-2 does not contain any guidance on the fire resistance of reinforced elements and simply makes reference to a code which is still in the course of preparation. BS 5628 Part 2 (Structural use of Reinforced and Prestressed Masonry) suggests that the masonry itself be considered as part of the cover and that the recommendations of BS 8110 (Structural use of Concrete) be followed. AS 3700 (SAA Masonry Code), on the other hand, specifies a minimum cover to the reinforcement for a specific fire resistance period. (See Table 7).

Table 7: Protection to reinforcement for structural adequacy (AS 3700)

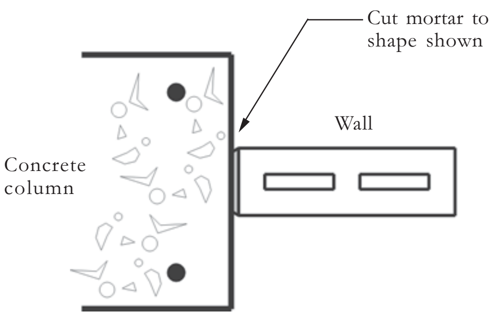
FIRE RESISTANCE PERIOD, MINUTES	30	60	90	120	180	240
Minimum dimension from the reinforcement to the exposed face of the masonry, mm	30	30	30	40	55	65

JUNCTION OF TWO WALLS AT CONTROL JOINT

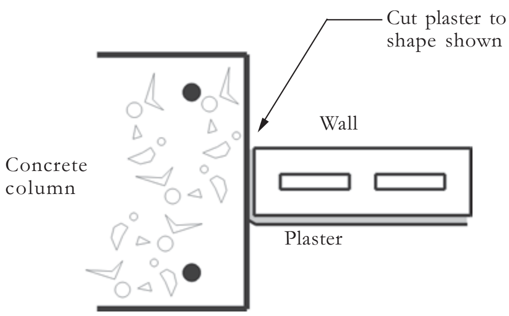


PLAN

JUNCTION OF WALL WITH CONTROL COLUMN



PLAN



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