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Prefabricated Reinforcement

Handbook

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Handbook

The Prefabricated Reinforcement Handbook is published by the Productivity Development Unit, Technology Development Division of the Construction Industry Development Board.

FOREWORD

The use of prefabricated reinforcement is an efficient and cost-effective option for projects having to use in-situ construction, particularly in respect of minimising wastage and overcoming site constraints. It is especially beneficial to Singapore's construction industry which is acutely short of skilled workers. Together with other buildable features, it will help to raise construction productivity, improve quality and reduce our heavy reliance on foreign workers.

This handbook is another effort by the industry to help engineers increase the buildability of their designs. It identifies the areas where prefabricated reinforcement can be used and promotes the use of standardised meshes and cages. The Handbook helps engineers by providing necessary design tables, construction details where relevant and annotations of prefabricated reinforcement. Some design examples are also provided.

I wish to thank members of the Steering Committee for their valuable feedback to this Handbook. I also wish to record my appreciation to TEG Engineering Consultants, Ho & Chang Consultants, B.R.C. Weldmesh (S.E.A.) Pte Ltd and Eastern Wire Pte Ltd who prepared most of the draft. I am confident that this Handbook will contribute to a better understanding and wider application of prefabricated reinforcement in the construction industry.

Tan Ee Ping
Chairman of Steering Committee
Prefabricated Reinforcement Handbook

ACKNOWLEDGMENT

The Prefabricated Reinforcement Handbook was developed jointly by CIDB, TEG Engineering Consultants, Ho & Chang Consultants, B.R.C. Weldmesh (S.E.A) Pte Ltd and Eastern Wire Pte Ltd.

CIDB would like to thank the chairman and members of the Steering Committee for their contributions towards the development of this Handbook.

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INTRODUCTION

OBJECTIVE

The objective of this Handbook is to promote the wider use of prefabricated reinforcement (welded wire fabric and prefabricated cages) by providing useful guidelines to engineers in the design of structural elements using such reinforcement. The wider use of prefabricated reinforcement will raise productivity, reduce site labour and shorten construction time.

SCOPE OF THE HANDBOOK

This Handbook contains tables of welded wire fabric and prefabricated cages. Design of reinforcement is based on BS8110: Structural Use of Concrete: Part 1: 1985, including subsequent revisions up to 1993. Prefabricated reinforcement can be used in slabs, columns, beams, walls, drains and pilecaps. Detailing of reinforcement in two-dimensional and isometric views and guidelines on installation are also provided.

WELDED WIRE FABRIC (WWF)

Welded Wire Fabric is manufactured using automatic welding machines, where parallel series of high strength cold drawn reinforcing wires are welded together in a square or rectangular grid. It uses electrical resistance welding process to fuse the intersecting wires into a homogeneous section and fix all wires in their proper position. Plain wires, deformed wires or a combination of both may be used in welded wire fabric.

In Singapore, WWF are manufactured in accordance to Singapore Standards SS 32 : Welded Steel Fabric for the Reinforcement of Concrete. The characteristic yield strength of WWF is 485 N/mm^2. Most of the local manufacturers have their WWF certified to the Singapore Quality Mark Scheme ensuring consistent quality of the product. However, engineers may also obtain a copy of test certificates from the supplier to ensure that the strength of the wire meets the requirements.

Currently, the four most commonly used preferred WWF are:

"A" Series: Square fabrics with wires at 200 mm spacing in both directions.

"B" Series: Rectangular fabrics with main wire spacing of 100 mm and cross wire spacing of 200 mm.

"D" Series: Square fabric with wires at 100 mm spacing in both directions.

"E" Series: Square fabric with wires at 150 mm spacing in both directions.

A, D and E fabrics series have equal sizes of wire and spacing in both directions. They are used where the structures they reinforced have to be equally strong in both directions, therefore providing similar areas of steel. B series fabrics are generally used in structures where the principal steel is in one direction, and the steel in the other direction is the minimum required by BS 8110. Standard sheet sizes of 6 m (length) by 2.4 m (width) are usually available ex-stock. Cut-to-size sheets are also readily available from the supplier in flat sheets or bent to required shape.

"Engineered" fabric series and "Designer" fabric series may also be fabricated by varying the diameter, spacing and position of the wire. In this Handbook, a new series of Designer fabric is introduced to increase the choices of WWF available. Engineers may also specify their own Designer Fabric or Engineered fabric in consultation with the suppliers.

PREFABRICATED CAGES

Prefabricated reinforcement improves site productivity and shortens construction time. Off-site fabrication, in the controlled environment of a factory, has the benefit of much higher productivity, better quality control and far less wastage of material. The contractor avoids keeping large quantity of material on site, minimises the tedious tasks of manual cutting, bending, laying and fixing of steel bars in the traditional manner.

WWF as described earlier is the most common prefabricated reinforcement used. WWF can be made from different types of reinforcement steel and is available up to the size of 16 mm diameter, e.g. main wire Tempcore bar T16 and cross wire cold drawn wire H10.

WWF in the form of beam link cages or column link cages is ideal for forming a quick skeleton of reinforcement onto which the main reinforcement can be secured. This form of cages is widely used in HDB projects and is starting to be used in the private sector.

Apart from the flat sheets and bent fabric where the intersections are resistance welded, flat, bent or 3-dimensional prefabricated reinforcement can also be formed using a mig welder to spot weld the reinforcement bars and/or WWF cages together. These assemblies are rigid enough for transport to site without damage and they can be lifted and dropped into the formwork ready to be concreted. With a mig welder it is possible to produce prefabricated reinforcement with diameters larger than 16 mm. This Handbook provides information on the use of prefabricated column cages, beam cages, pile caps and other structural elements. Engineers should check with the manufacturer for more information on design considerations, detailing and supply of the prefabricated reinforcement.

GUIDE TO SECTIONS

The following Sections feature design guidelines and examples using prefabricated reinforcement for slabs, beams, columns, walls, pilecaps and other applications. Design assumptions as well as relevant details are also provided.

New annotations such as S2T10-200 (beam link cage), 3LH10-175 (column close link cage), WA125-A10 (wall type), 1RP150 (single pile type for precast reinforced concrete driven pile) and 5BP600 (5 pilegroup type for bored pile) have been introduced in an attempt to standardise the specifications of these prefabricated reinforcement.

SECTION ONE

SLAB REINFORCEMENT

SECTION ONE : SLAB REINFORCEMENT

This Section enables engineer to select welded wire fabric (WWF) from design tables based on the design considerations shown below for one-way and two-way continuous slabs.

1.1 Design Considerations

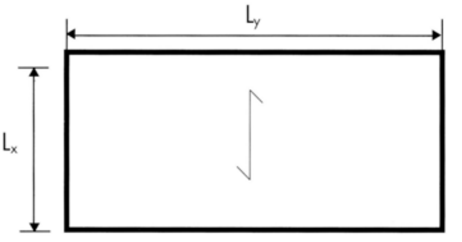
1. 25mm nominal cover to steel reinforcement is adopted.
2. 2.7 kN/m^2 is taken as Superimposed Dead Loads (including dead load for finishes, partition, services, etc.).
3. Concrete Grade 30 is adopted in the design for Table 'SA1' to Table 'SA18'.
4. Design criteria complies to BS 8110: Part 1: 1985: Section Three.
5. Design Tables are categorised based on shortest slab span, L_x criteria followed by ultimate design loads (excluding slab self weight) as shown in Table 'A' below.

TABLE 'A'

Slab Span, L_x	Ultimate Design Loads, W (kN/m^2)	Design Table
Lx $\leq$ 3.0	W $\leq$ 8.6	'SA1'
	8.6 < W $\leq$ 11.8	'SA2'
	11.8 < W $\leq$ 15.8	'SA3'
	15.8 < W $\leq$ 23.8	'SA4'
	23.8 < W $\leq$ 27.8	'SA5'
	27.8 < W $\leq$ 35.8	'SA6'
3.0 < Lx $\leq$ 3.6	W $\leq$ 8.6	'SA7'
	8.6 < W $\leq$ 11.8	'SA8'
	11.8 < W $\leq$ 15.8	'SA9'
	15.8 < W $\leq$ 23.8	'SA10'
	23.8 < W $\leq$ 27.8	'SA11'
	27.8 < W $\leq$ 35.8	'SA12'
3.6 < Lx $\leq$ 4.8	W $\leq$ 8.6	'SA13'
	8.6 < W $\leq$ 11.8	'SA14'
	11.8 < W $\leq$ 15.8	'SA15'
	15.8 < W $\leq$ 23.8	'SA16'
	23.8 < W $\leq$ 27.8	'SA17'
	27.8 < W $\leq$ 35.8	'SA18'

6. Mesh provided in Table 'SA1' to Table 'SA18' are designed based on the longest slab span dimension, L_x and highest end of ultimate design load category, W of the Table 'A' above.
7. Engineer shall consider the continuity effect if adjacent slab panels are of different thickness and/or having drop affecting the design effective depth.
8. Extra allowance of reinforcement areas i.e. 50mm has been provided to the designed required steel area when selecting the mesh.

1.2 Examples On Slab Design



EXAMPLE (1)

Design Data :

Slab sizes: L_y = 6.5 m, L_x = 3.0 m.

1. Slab type: Two Adjacent Edges Discontinuous.
2. Design Live Load, LL = 3.0 kN/m^2
   Superimposed Dead Load, SDL = 2.7 kN/m^2

Design Method:

Step 1: For L_x = 3.0 m ⇒ Table 'SA1' to Table 'SA6'

Step 2: Calculate the ultimate design load (excluding slab self-weight),

W = (1.4 x SDL) + (1.6 x LL) = (1.4 x 2.7) + (1.6 x 3.0)
= 8.58 kN/m^2

W < 8.6 kN/m^2 ⇒ go to Table 'SA1'

Step 3: Span Ratio = L_y/L_x = 6.5/3.0 = 2.17 > 2.0 ⇒ One-Way Slab ⇒ Column "9"

Slab Panel Type : Two Adjacent Edges Discontinuous ⇒ Row "4"

RESULT ⇒ 125 mm thick slab with
WWF B8 (Top Mesh - L_x Direction), WWF A7 (Top Mesh - L_y Direction) and
WWF B6 (Bottom Mesh) satisfying deflection, shear and moment criteria.

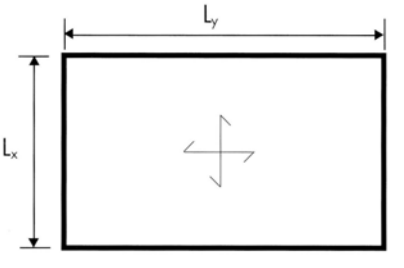
(Note: If engineer prefers other slab thickness to be used, the design has to be extended to *Step 4*.)

Step 4: Work out the self-weight difference between the slab thickness preferred and one recommended in the Design Table 'SA1'.

For instance, slab thickness 150 mm is preferred.

- New additional weight due to increase in slab thickness
  = (0.15 - 0.125) x 24 = 0.6 kN/m^2
- New ultimate design load = (1.4 x 0.6 + 8.58) = 9.42 kN/m^2 ⇒ go to Table 'SA2'
- Repeat *Step 3* ⇒ read Column "9" & Row "4"
- RESULT ⇒ 125 mm thick slab with
  WWF B8 (Top Mesh - L_x Direction), WWF B6 (Top Mesh – L_y Direction) and
  WWF B8 (Bottom Mesh) satisfying deflection, shear and moment criteria.

Therefore, engineer can use the preferred slab thickness 150 mm with the above designed mesh.



EXAMPLE (2) :

Design Data:

1. Slab Sizes: L_y = 6.0 m, L_x = 4.0 m.
2. Slab Type: Interior Panel.
3. Design Live Load, LL = 6.0 kN/m^2
   Superimposed Dead Load, SDL = 5.0 kN/m^2

Design Method:

Step 1: For L_x = 4.0 m ⇒ Table 'SA13' to Table 'SA18'

Step 2: Calculate the ultimate design load (excluding slab self-weight),

W = (1.4 x SDL) + (1.6 x LL) = (1.4 x 5.0) + (1.6 x 6.0)
= 16.6 kN/m^2

15.8 kN/m^2 < W ≤ 23.8 kN/m^2 ⇒ go to Table 'SA16'

Step 3: Span Ratio = L_y/L_x = 6/4 = 1.5 < 2.0 ⇒ Two-Way Slab ⇒ Column "6"

Slab Type: Interior Panel ⇒ Row "1"

- RESULT ⇒ 175 mm thick slab with

WWF DA10/10 (Top Mesh - L_x Direction), WWF B8 (Top Mesh - L_y Direction) and
WWF DE9/8 (Bottom Mesh) satisfying deflection, shear and moment criteria.

Step 4: Slab thickness 225 mm is preferred.

- New additional weight due to increase in slab thickness
  = (0.225 - 0.175) x 24 = 1.2 kN/m^2
- 'New' ultimate design load = (1.4 x 1.2 + 16.6) = 18.28 kN/m^2 ⇒ go to Table 'SA16'
- RESULT ⇒ 225 mm thick slab with
  WWF DA10/10 (Top Mesh - L_x Direction), WWF B8 (Top Mesh - L_y Direction) and
  WWF DE9/8 (Bottom Mesh) satisfying deflection, shear and moment criteria.

1.3 Slab Design Tables

TABLE SA1	SLAB SPAN	$L_X \le 3.0$m	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$W \le 8.6$ kN/m^2	
TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE			

TYPES OF SLAB PANEL		(L_y/ L_X) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	B6	B6	B6	B6	B6
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	B6
	Bottom mesh	A7	A7	A7	A7	A7	A7	A7	A7	B6
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	B6	B6	B6	B6	B6	B6	B6
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	A7	A7	A7	A7	B6	B6
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	B6	B6	B6	B6	B6	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	A7	A7	A7	A7	B6	B6
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B6	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	B6	B6	B6	B6	B6	B6	B6
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	B6	B6	B6	B6	B6	B6	B6	B6
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	A7	A7	B6	B6	B6	B6
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	B6	B6	B6	B8	B8	B8	B8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	B6	B6	B6	B6	B6	B6	B6	B6
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	B6	B6	B6	B8	B8	B8	B8	B8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8

TABLE SA2

SLAB SPAN: $L_X \leq 3.0m$

ULTIMATE (SDL +LL): $8.6\ kN/m^2 < W \leq 11.8\ kN/m^2$

Concrete Grade $30N/mm^2$

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_X) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	B6	B6	B6	B6	B6	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	A7	A7	B6	B6	B6	B6
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B6	B6	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	B6	B6	B6	B6	B6	B6
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	B6	B6	B6	B6	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	B6	B6	B6	B6	B6	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B6	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	B5	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	B6	B6	B6	B6	B6	B6	B6	B6
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	B6	B6	B8	B8	B8	B8	B8	B8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B6	B6	B6	B6	B6	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A8	A8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A8	A8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8

TABLE SA3	SLAB SPAN	$L_X \leq 3.0m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$11.8\ kN/m^2 < W \leq 15.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	A7	B6	B6	B6	B6	B6	B6	B6
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B6	B6	B6	B6	B6	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B6	B8	B8	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B9	B9
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B6	B6	B6	B6	B6	B6	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A8	A8	A8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B9	B9
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	E7	B8	B8	B8	B8	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A7	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B6	B6
	Bottom mesh	A8	B8	B8	B8	B8	B8	B9	B8	B8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A8	A8	A8	A8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A8	A8	A8	A8
	Bottom mesh	A9	D7	DE8/8	DE8/8	DE8/8	B8	B8	B8	B8

TABLE SA4	SLAB SPAN	$L_X \leq 3.0m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$15.8\ kN/m^2 < W \leq 23.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B9	B10	B10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B6	B8	B8	B8	B8	B8	B8	B9	B9
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B9	B9	B9
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B9	B9	B9
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	150	150	150	150
	Top mesh (lx direction)	B8	B8	B9	B9	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A8	A8	A8	A8
	Bottom mesh	D7	D7	DE8/8	DE8/8	DE8/8	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	DE8/8	B8	B8	B8	B9	B9	B10	B10
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	125	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	E9	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE10/8	DE10/8

TABLE SA5	SLAB SPAN	$L_x \leq 3.0$m	Concrete Grade 30N/mm[2]
	ULTIMATE (SDL +LL)	23.8 kN/m^2 < W $\leq$ 27.8 kN/m^2	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	D7	A10	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE9/8	DE9/8	B9	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B6	B6	B6	B6
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	150	150	150	150	150
	Top mesh (lx direction)	E9	EA10/10	AA13/10	AA13/10	EA10/10	DE9/8	DE9/8	AA13/10	AA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	D7	DE8/8	DE8/8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A9	D7	D7	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	A9	DE8/8	B8	B8	B8	B9	B9	B10	B10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	150	125	150	150	150	150
	Top mesh (lx direction)	B8	B9	B9	B9	B9	B9	B10	B10	B10
	Top mesh (ly direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	E9	EA10/10	DE8/8	DE8/8	DE8/8	DE8/8	EA10/10	EA10/10
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B9	B9	B9	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	EA10/10	AA13/10	DE8/8	DE9/8	DE9/8	DE10/8	DE10/8	DE10/8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A10	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	DA10/10

TABLE SA6

SLAB SPAN	$L_X \leq 3.0m$	Concrete Grade $30N/mm^2$
ULTIMATE (SDL +LL)	$27.8\ kN/m^2 < W \leq 35.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_X) Ratio								ONE-WAY SLAB
		1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.75**	**2.0**	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	EA10/10	EA10/10	EA10/10	AA13/10	DE8/8	AA13/10	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	D7	DE8/8	DE8/8	B8	DE8/8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	EA10/10	AA13/10	AA13/10	DE9/8	DE9/8	DE9/8	DE10/8	DE10/8	DE10/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	B8	B8	B8	B9	B9	B9
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	150	150	150	150	150	150	175
	Top mesh (lx direction)	E10	E11	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	EA13/10	EA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B9	B8	B8
	Bottom mesh	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	150	150	150	150	150
	Top mesh (lx direction)	B8	B9	B9	B9	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A7	A7	A7	A7	A8	A8	A8	A8	A8
	Bottom mesh	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	DE9/8	DE9/8	DE10/8	EA13/10	EA13/10	EA13/10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B9	B9	B10	B10	B10	B11	B11	B11
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	E9	EA10/10	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	AA13/10
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B9	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	A11	EA10/10	AA13/10	AA13/10	DA10/10	DA10/10	EA13/10	DE11/9	DE11/9
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D8	A12	A13	E12	E12	E13	D11	D12	D12

TABLE SA7	SLAB SPAN	$3.0m < L_X \leq 3.6m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$W \leq 8.6\ kN/m^2$	
TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE			

TYPES OF SLAB PANEL		(L_y/L_X) Ratio								ONE-WAY SLAB
		1	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	A7	B6	B6	B6	B6	B6	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A7	A7	A7	B6	B6	B6	B6	B6	B6
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B6	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	B6	B6	B6	B6	B6	B6	B6	B6
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	A7	B6	B6	B6	B6	B6	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	E7	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B6	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B6	B6	B6	B6	B6	B6	B6	B6	B6
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A8	A8	A8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	A8	B8	B8	B8	B8	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A7	A7	A7	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B6	B6	B6
	Bottom mesh	A8	B8	B8	B8	B8	B8	B8	B8	B8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8

TABLE SA8	SLAB SPAN	$3.0m < L_X \leq 3.0m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$8.6\ kN/m^2 < W \leq 11.8kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_X) Ratio 1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	ONE-WAY SLAB
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B6	B6	B6	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	E6	B6	B6	B6	B6	B6	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B6	B6	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B9	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B6	B6	B6
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A7
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B8	B8	B8	B8	B8	B8	B9	B9
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	125	125	125	125	125	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B8	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A8	A8	A8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A7	A7	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B9	B9
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A9	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8

TABLE SA9	SLAB SPAN	$3.0m < L_X \leq 3.6m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$11.8\ kN/m^2 < W \leq 15.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	125
	Top mesh (lx direction)	DE7/8	DE7/8	DE7/8	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	DE7/7	A10	DE8/8	B8	B8	B8	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B8	B8	B8	B8	B8	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	150	150	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	125	125	125	125	125	125	125	125	150
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B9	B8	B8
	Top mesh (ly direction)	A7	A7	A7	A7	A7	A7	A7	A7	A8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	125	125	150	150	150	150	150	150	175
	Top mesh (lx direction)	A7	A7	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B6	B6
	Bottom mesh	B8	B8	B8	B8	B8	B8	B9	B9	B9
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	125	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	B8	B8	B8	B8	B8	B8	B8	B8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	125	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	A7	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	B8	B8	B8	B8	B9	B9	B10	B10
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	B10
	Bottom mesh	D7	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8

TABLE SA10	SLAB SPAN	$3.0m < L_X \leq 3.6m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$15.8\ kN/m^2 < W \leq 23.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	125	125	125	150	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	EA10/10	B8	B8	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE9/8	DE9/8	AA13/10	DE10/8	DE10/8	DE10/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B9	B9	B9
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	E9	EA10/10	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	EA13/10	EA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	D7	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A9	D7	D7	A10	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	A9	DE8/8	DE8/8	DE8/8	B9	B9	B10	B10	B10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	150	150	150	150	150	150	150	175	175
	Top mesh (lx direction)	B8	B8	B9	B10	B10	B10	B11	B10	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A10	EA10/10	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	DE9/8	DE9/8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	150	150	150	150	150	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B9	B9	B9	B9	B9	B8	B8	B8	B8
	Bottom mesh	D7	EA10/10	AA13/10	AA13/10	DA10/10	DE9/8	DE10/8	DE10/8	DE10/8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	150	175	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D8	E11	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	EA13/10	EA13/10

TABLE SA11	SLAB SPAN	$3.0m < L_x \leq 3.4m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$23.8\ kN/m^2 < W \leq 27.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	E8	D7	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	175	175	175
	Top mesh (lx direction)	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	DE8/8	DE8/8	DE9/8	DE9/8	DE10/8	DE10/8	EA13/10	DE11/8	DE11/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B9	B9	B9	B10	B10
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	175	175	175	175
	Top mesh (lx direction)	DE8/9	DE9/9	DE9/9	DE10/8	DE10/9	AA13/10	DA10/10	DA10/10	DA10/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	EA10/10	DE9/8	DE8/8	DE9/8	DE9/8	DE9/8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B8	B9	B9	B9	B9	B10	B10	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	A10	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE9/8	DE9/8	DE9/8	AA13/10	DE10/8	EA13/10	EA13/10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	150	150	150	150	150	175	175	175	175
	Top mesh (lx direction)	B9	B10	B10	B10	B11	B10	B10	B11	B11
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	DE8/9	DE8/9	DE9/9	DE9/9	DE9/9	DE9/8	DE9/8	DE9/8	DE9/8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	150	150	175	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B9	B9	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	DE8/9	DE9/9	DE9/8	DE9/8	AA12/10	DE10/8	A13/10	EA13/10	EA13/10
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A12	DE9/9	DE9/9	DE10/9	DE10/9	DE10/9	DE11/9	DE11/9	DE11/9

TABLE SA12	SLAB SPAN	$3.0m < L_X \leq 3.6m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$27.8\ kN/m^2 < W \leq 35.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_X) Ratio								ONE-WAY SLAB
		1.0	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.75**	**2.0**	
1. INTERIOR PANELS	Thickness (mm)	150	150	150	150	150	150	150	150	175
	Top mesh (lx direction)	B8	B8	B9	B9	B9	B10	B10	B10	B9
	Top mesh (ly direction)	B6	B6	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	A9	D7	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE8/8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	175
	Top mesh (lx direction)	B8	B9	B9	B9	B10	B10	B11	B11	B10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	D7	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE8/8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	175	175	175	175	175
	Top mesh (lx direction)	B8	B9	B10	B10	B10	B11	B11	B11	B11
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	DE9/8	DE8/8	DE9/8	DE9/8	DE10/8	DE10/8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	175	175	175	175	175	175
	Top mesh (lx direction)	B10	B10	B11	B10	B10	B11	B11	B11	B11
	Top mesh (ly direction)	B9	B9	B9	B8	B8	B8	B8	B8	B8
	Bottom mesh	EA10/10	EA10/10	AA13/10	DE9/8	DE9/8	DE9/8	DE10/8	DE10/8	DE10/8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	175	175
	Top mesh (lx direction)	B9	B9	B10	B10	B10	B11	B11	B10	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	E9	EA10/10	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	DE9/8	DE9/8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B9	B9	B9	B8	B8	B8	B8	B8	B8
	Bottom mesh	E9	AA13/10	AA13/10	DE10/8	DE10/8	DE11/8	DE11/8	DE12/8	DE12/8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	150	150	175	175	175	175	175	175	175
	Top mesh (lx direction)	B10	B11	B11	B11	B11	B11	B12	B12	B12
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	E10	E11	E10	E11	E11	E11	DE10/9	DE11/9	DE11/9
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	150	150	175	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	B10	B10	B9	B9	B9	B9	B9	B9	B9
	Bottom mesh	E10	E11	DE10/9	DE10/9	DE11/9	DE11/9	DE12/9	DE12/9	DE12/9
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A13	A13	D10	D11	D11	D12	D12	D13	B13

TABLE SA13	SLAB SPAN	$3.6m < L_X \leq 4.8m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$W \leq 8.6\ kN/m^2$	
TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE			

TYPES OF SLAB PANEL		(L_y/ L_X) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	E7	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B6	B6	B6	B6	B6	B6	B6	B6	B6
	Bottom mesh	B6	B6	B6	B6	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B6	B6	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	175	175	175
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B9	B9	B9	B9
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B6	B6	B6
	Bottom mesh	B6	B8	B8	B8	B8	B8	B8	B8	B8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	D7	DE8/8	DE8/8	EA10/10	DE9/8	DE8/8	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	150	150	150
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B8	B9	B9
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	175	175	175	175	175	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	D6	D6
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B9	B9	B9
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	175	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	B8	B8	B8	B8	B9	B9	B9	B9	B9
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	A9	DE7/7	DE7/7	DE7/7	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	150	150	175	175	175	175	175	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	A8	D6	D6
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	B9	B9
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	175	200	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	A8	A8	D6	D6	D6
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	D6	D6	D6
	Bottom mesh	D7	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8

TABLE SA14	SLAB SPAN	3.6m < Lx ≤ 4.8m	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$8.6\ kN/m^2 < W \leq 11.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	125	150	150	150	150	150	150	175	175
	Top mesh (lx direction)	D7	D7	A10	DE8/8	DE8/8	DE8/8	DE9/8	B8	B8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B6	B6
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	150	150	150	175	175	175
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE8/8	EA10/10	EA10/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	150	150	175	175	175	175	175	175
	Top mesh (lx direction)	D7	DE8/8	EA10/10	DE8/8	DE9/8	DE9/8	AA13/10	DE10/8	DE10/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B9	B9
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	EA10/10	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE10/8	DE10/8	DE10/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	B8	B8	B8	B8	B8	B9	B9	B9
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	150	175	175	175	175	175	175	175
	Top mesh (lx direction)	B8	B8	B8	B8	B8	B8	B9	B9	B9
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	E8	D7	B8	B8	B8	B8	B8	B8	B8
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	200	200	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	A8	D6	D6	D6	D6
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	B8	B8	B9	B9	B9	B9	B10	B10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	175	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	B8	B9	B9	B9	B10	B10	B10	B10	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	A10	DE8/8	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	175	175	175	175	200	200	200	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	D6	D6	D6	D6	D6
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	AA13/10	DE10/8	DE10/8
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	175	175	175	200	200	200	200	200	200
	Top mesh (lx direction)	A8	A8	A8	D6	D6	D6	D6	D6	D6
	Top mesh (ly direction)	A8	A8	A8	D6	D6	D6	D6	D6	D6
	Bottom mesh	DE8/9	E10	DE9/9	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	DA10/10

TABLE SA15

SLAB SPAN	$3.6m < L_X \leq 4.8m$	Concrete Grade $30N/mm^2$
ULTIMATE (SDL +LL)	$11.8\ kN/m^2 < W \leq 15.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/ L_X) Ratio 1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	ONE-WAY SLAB
1. INTERIOR PANELS	Thickness (mm)	150	150	150	175	175	175	175	175	175
	Top mesh (lx direction)	D7	DE8/8	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B6	B6
	Bottom mesh	B8	B8	B8	B8	B8	B8	B8	B8	B8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	EA10/10	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	AA13/10	AA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	B8	B8	B8	B8	B8	B8	B8	B8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	150	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	EA10/10	DE8/8	DE9/8	DE9/8	AA13/10	DE10/8	DE10/8	EA13/10	EA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	B8	B8	B8	B8	B9	B9	B10	B10
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	175	200	200	200
	Top mesh (lx direction)	EA10/10	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	DA10/10	DA10/10	DA10/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	175	175	175	175
	Top mesh (lx direction)	B8	B8	B9	B9	B9	B9	B10	B10	B10
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	A8	A8	A8
	Bottom mesh	D7	D7	DE8/8	DE8/8	DE8/8	DE8/8	DE8/8	EA10/10	EA10/10
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	200	200	200	200	200	200
	Top mesh (lx direction)	A8	A8	A8	D6	D6	D6	D6	D6	D6
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE9/8	DE9/8	DE9/8	AA13/10	EA13/10	EA13/10	EA13/10
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	175	175	175	175	175	175	200	200	200
	Top mesh (lx direction)	B9	B9	B10	B10	B11	B11	B10	B11	B11
	Top mesh (ly direction)	A8	A8	A8	A8	A8	A8	D6	D6	D6
	Bottom mesh	E9	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	AA13/10	AA13/10	AA13/10
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	175	175	175	175	200	200	200	200	200
	Top mesh (lx direction)	A8	A8	A8	A8	D6	D6	D6	D6	D6
	Top mesh (ly direction)	B9	B9	B9	B9	B8	B8	B8	B8	B8
	Bottom mesh	E9	EA10/10	AA13/10	DA10/10	AA13/10	DA10/10	EA13/100	EA13/10	EA13/10
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	A8	D6	D6	D6	D6	D6	D6	D6	D6
	Top mesh (ly direction)	A8	D6	D6	D6	D6	D6	D6	D6	D6
	Bottom mesh	A12	A12	E11	E12	E12	D10	E13	D11	D11

TABLE SA16	SLAB SPAN	$3.6m < L_X \leq 4.8m$	Concrete Grade $30N/mm^2$
	ULTIMATE (SDL +LL)	$15.8 kN/m^2 < W \leq 23.8 kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_X) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	175	175	175	175	175	175	175	200	200
	Top mesh (lx direction)	E9	EA10/10	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	DE10/8	DE10/8
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	E8	D7	DE8/8	DE8/8	DE8/8	DE9/8	DE9/8	B9	B9
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	200	200	200	200
	Top mesh (lx direction)	E10	E11	E11	E12	E12	AA13/10	DA10/10	DA10/10	DA10/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	DE8/8	DE8/8	DE8/8	EA10/10	DE9/8	DE8/8	DE9/8	DE9/8	DE9/8
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	200	200	200	225	225
	Top mesh (lx direction)	E10	A13	E12	B11	DA10/10	EA13/10	DE11/9	DE11/9	DE11/9
	Top mesh (ly direction)	B8	B8	B8	B9	B8	B8	B8	B8	B8
	Bottom mesh	DE8/8	DE8/8	DE9/8	DE11/9	DE9/8	DE9/8	DE10/8	DE10/8	DE10/8
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	175	175	200	200	200	200	200	200	200
	Top mesh (lx direction)	E11	E12	E12	D10	E13	E13	D12	D12	D12
	Top mesh (ly direction)	B9	B9	B9	B9	B9	B9	B9	B9	B9
	Bottom mesh	DE8/9	DE9/9	AA13/10	AA13/10	AA13/10	DA10/10	DA10/10	EA13/10	EA13/10
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	200	200	200	200
	Top mesh (lx direction)	B9	B10	B10	B10	B10	B10	B10	B11	B11
	Top mesh (ly direction)	A8	A8	A8	A8	A8	D6	D6	D6	D6
	Bottom mesh	DE8/9	DE8/9	DE9/9	DE9/9	DE9/9	AA13/10	AA13/10	AA13/10	AA13/10
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	175	175	200	200	200	200	225	250	250
	Top mesh (lx direction)	A8	A8	D6	D6	D6	D6	A9	D7	D7
	Top mesh (ly direction)	B9	B9	B9	B9	B9	B9	B8	B8	B8
	Bottom mesh	DE8/9	DE9/9	AA13/10	DE10/10	EA13/10	EA13/10	DE11/8	DE11/8	DE11/8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	200	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	B10	B10	B11	B11	B11	B12	B12	B12	B12
	Top mesh (ly direction)	D6	D6	D6	D6	D6	D6	D6	D6	D6
	Bottom mesh	D8	A12	E11	A13	E12	E12	D10	E13	E13
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	175	200	200	200	200	200	225	225	225
	Top mesh (lx direction)	A8	D6	D6	D6	D6	D6	A9	A9	A9
	Top mesh (ly direction)	B10	B10	B10	B10	B10	B10	B9	B9	B9
	Bottom mesh	A12	E11	E12	E13	E13	D12	DE12/9	DE12/9	DE12/9
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	200	200	200	200	200	200	225	225	225
	Top mesh (lx direction)	D6	D6	D6	D6	D6	D6	A9	A9	A9
	Top mesh (ly direction)	D6	D6	D6	D6	D6	D6	A9	A9	A9
	Bottom mesh	E11	E12	E13	D11	D12	D12	D12	D12	D12

TABLE SA17	SLAB SPAN	$3.6m < L_X \leq 4.8m$	Concrete Grade 30N/mm²
	ULTIMATE (SDL +LL)	$23.8\ kN/m^2 < W \leq 27.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

TYPES OF SLAB PANEL		(L_y/L_x) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	175	175	175	175	175	175	200	200	200
	Top mesh (lx direction)	A11	A12	E11	E12	E12	E12	DA10/10	EA13/10	EA13/10
	Top mesh (ly direction)	B8	B8	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	D7	DE8/8	DE8/8	EA10/10	DE9/8	DE9/8	DE9/8	DE9/8	DE9/8
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	175	175	175	175	200	200	200	200
	Top mesh (lx direction)	E11	A13	E12	D10	E13	E12	E13	E13	E13
	Top mesh (ly direction)	B9	B9	B9	B9	B9	B8	B8	B8	B8
	Bottom mesh	EA10/10	EA10/10	AA13/10	AA13/10	AA13/10	DE9/8	DE9/8	AA13/10	AA13/10
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	175	175	200	200	200	200	200	225	225
	Top mesh (lx direction)	E11	A12	E12	E13	E13	D11	D12	D13	D13
	Top mesh (ly direction)	B9	B9	B8	B8	B8	B8	B8	B8	B8
	Bottom mesh	EA10/10	AA13/10	DE9/8	DE9/8	AA13/10	DE10/8	EA13/10	EA13/10	EA13/10
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	E12	E12	E13	E13	D11	D12	D12	D13	D13
	Top mesh (ly direction)	B10	B9	B9	B9	B9	B9	B9	B9	B9
	Bottom mesh	A12	DE9/9	DE9/9	DE10/9	DE10/9	DE10/9	DE11/9	DE11/9	DE11/9
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	B10	B10	B10	B10	B10	B11	B11	B11	B11
	Top mesh (ly direction)	A8	D6	D6	D6	D6	D6	D6	D6	D6
	Bottom mesh	E10	DE8/9	E10	DE9/9	DE9/9	DE9/9	DE10/9	DE10/9	DE10/9
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	225	225	225
	Top mesh (lx direction)	A8	D6	D6	D6	D6	D6	A9	A9	A9
	Top mesh (ly direction)	B10	B9	B9	B9	B9	B9	B8	B8	B8
	Bottom mesh	E10	DE9/9	DE10/9	DE11/9	DE11/9	DE12/9	DE11/8	DE11/8	DE11/8
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	200	200	200	200	200	200	200	225	225
	Top mesh (lx direction)	B10	B11	B11	B12	B12	B12	DE13/8	B12	B12
	Top mesh (ly direction)	D6	D6	D6	D6	D6	D6	D6	A9	A9
	Bottom mesh	A12	E11	E12	E12	D10	E13	E13	E13	E13
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	200	200	200	200	200	225	225	225	225
	Top mesh (lx direction)	D6	D6	D6	D6	D6	A9	A9	A9	A9
	Top mesh (ly direction)	B10	B10	B10	B10	B10	B10	B10	B10	B10
	Bottom mesh	A12	E12	E13	E13	D12	D12	D12	D13	D13
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	200	200	225	225	225	225	225	225	225
	Top mesh (lx direction)	D6	D6	A9	A9	A9	A9	A9	A9	A9
	Top mesh (ly direction)	D6	D6	A9	A9	A9	A9	A9	A9	A9
	Bottom mesh	E12	E13	E13	D11	D12	D12	D13	D13	D13

TABLE SA18

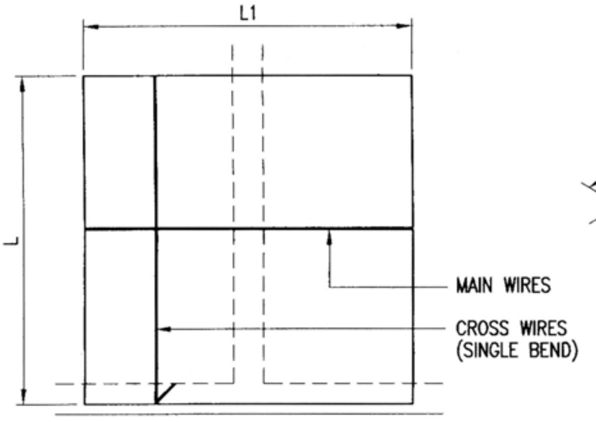
SLAB SPAN	$3.6m < L_X \leq 4.8m$	Concrete Grade $30N/mm^2$
ULTIMATE (SDL +LL)	$27.8\ kN/m^2 < W \leq 35.8\ kN/m^2$	

TWO-WAY SLAB DESIGN IN ACCORDANCE TO BS 8110: PART 1: 1985 : SECTION THREE

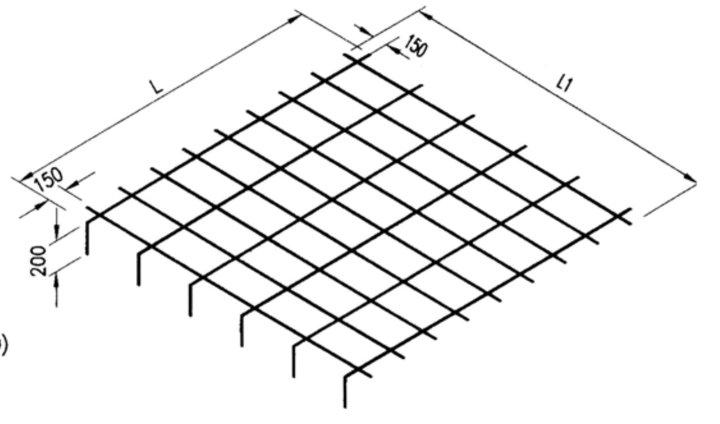
TYPES OF SLAB PANEL		(L_y/ L_X) Ratio								ONE-WAY SLAB
		1.0	1.1	1.2	1.3	1.4	1.5	1.75	2.0	
1. INTERIOR PANELS	Thickness (mm)	175	175	175	175	175	200	200	200	200
	Top mesh (lx direction)	E11	E12	D10	E13	D11	E13	D11	D12	D12
	Top mesh (ly direction)	B9	B9	B9	B9	B9	B9	B9	B9	B9
	Bottom mesh	E9	E10	DE9/9	DE10/90	DE10/9	AA13/10	DA10/10	DA10/10	DA10/10
2. ONE SHORT EDGE DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	E12	E12	D10	E13	E13	D11	D12	D12	D12
	Top mesh (ly direction)	B10	B9	B9	B9	B9	B9	B9	B9	B8
	Bottom mesh	A12	DE9/9	DE9/9	DE9/9	DE10/9	DE10/9	DE10/9	DE11/9	DE11/9
3. ONE LONG EDGE DISCONTINUOUS	Thickness (mm)	175	200	200	200	200	200	200	225	225
	Top mesh (lx direction)	E12	D10	E13	D12	D12	D13	D13	D13	D13
	Top mesh (ly direction)	B10	B9	B9	B9	B9	B9	B9	B9	B9
	Bottom mesh	A12	DE9/9	DE10/9	DE10/9	DE11/9	DE11/9	DE12/9	DE11/9	DE11/9
4. TWO ADJACENT EDGE DISCONTINUOUS	Thickness (mm)	200	200	200	200	200	200	225	225	225
	Top mesh (lx direction)	E12	E13	D12	D12	D13	D13	D13	D13	D13
	Top mesh (ly direction)	B10	B10	B10	B10	B10	B10	B9	B9	B9
	Bottom mesh	E11	A13	E12	E13	E13	D11	D11	D12	D12
5. TWO SHORT EDGE DISCONTINUOUS	Thickness (mm)	200	200	200	200	200	200	200	200	200
	Top mesh (lx direction)	B10	B11	B11	B11	B11	B12	B12	B12	B12
	Top mesh (ly direction)	D6	D6	D6	D6	D6	D6	D6	D6	D6
	Bottom mesh	A12	E11	E11	E12	E12	E12	E13	E13	E13
6. TWO LONG EDGE DISCONTINUOUS	Thickness (mm)	200	200	200	200	200	225	225	250	250
	Top mesh (lx direction)	D6	D6	D6	D6	D6	A9	A9	D7	D7
	Top mesh (ly direction)	B10	B10	B10	B10	B10	B9	B9	B9	B9
	Bottom mesh	A12	E12	E13	D12	D13	D12	D13	DE13/9	DE13/9
7. THREE EDGE DISCONTINUOUS (ONE LONG EDGE CONTINUOUS)	Thickness (mm)	200	200	200	200	225	225	225	250	250
	Top mesh (lx direction)	B11	B12	DE13/8	DE13/8	DE13/8	DE13/8	DE13/8	DE13/8	DE13/8
	Top mesh (ly direction)	D6	D6	D6	D6	A9	A9	A9	D7	D7
	Bottom mesh	E12	D10	E13	D11	E13	E13	D12	D11	D11
8. THREE EDGE DISCONTINUOUS (ONE SHORT EDGE CONTINUOUS)	Thickness (mm)	200	200	200	200	225	225	250	250	250
	Top mesh (lx direction)	D6	D6	D6	D6	A9	A9	D7	D7	D7
	Top mesh (ly direction)	B11	B11	B11	B11	B11	B11	B10	B10	B10
	Bottom mesh	A13	E13	D12	D13	D12	D13	D13	D13	D13
9. FOUR EDGES DISCONTINUOUS	Thickness (mm)	200	200	225	225	225	225	250	275	275
	Top mesh (lx direction)	D6	D6	A9	A9	A9	A9	D7	A10	A10
	Top mesh (ly direction)	D6	D6	A9	A9	A9	A9	D7	A10	A10
	Bottom mesh	E13	D12	D12	D13	D13	D13	D13	D13	D13

1.4 Illustration On Use Of Mesh

SINGLE-BEND FABRIC

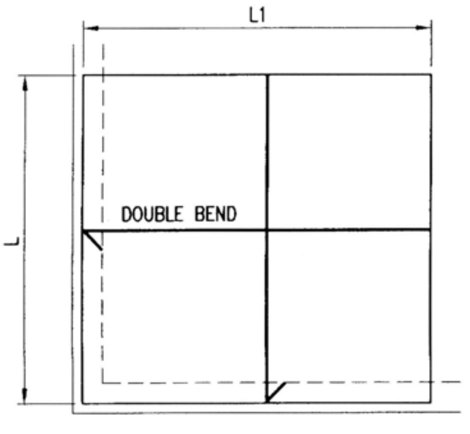


Plan of Top Reinforcement at Slab

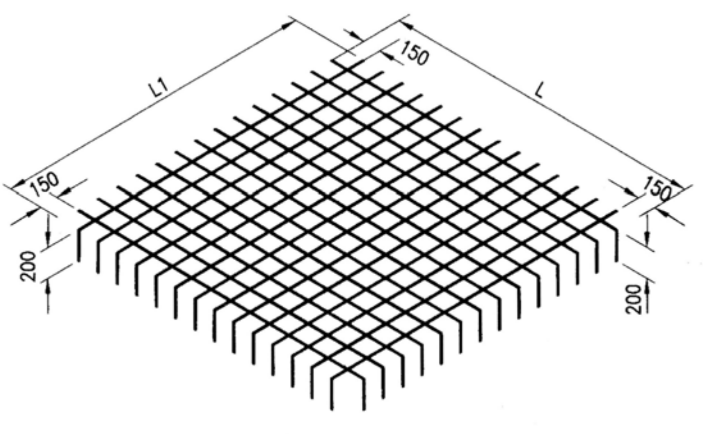


Isometric View

DOUBLE-BEND FABRIC

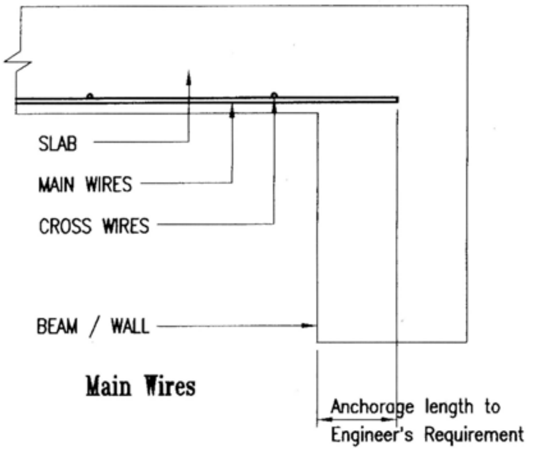


Plan of Top Reinforcement at Slab

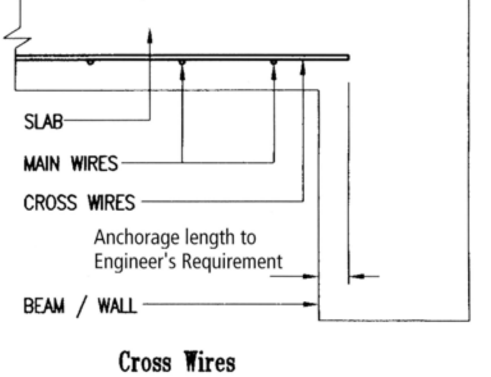


Isometric View

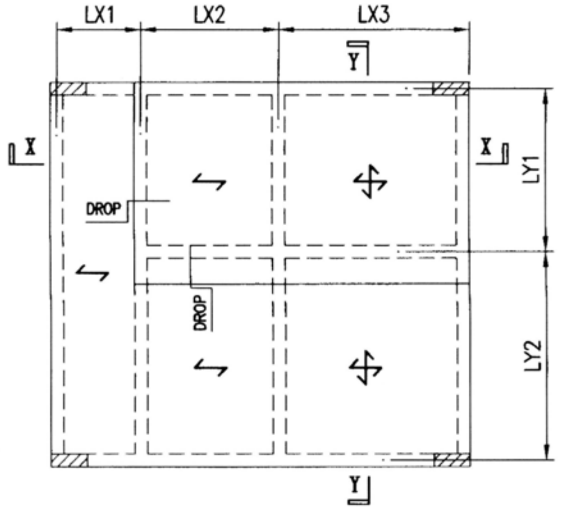
ANCHORAGE LENGTH



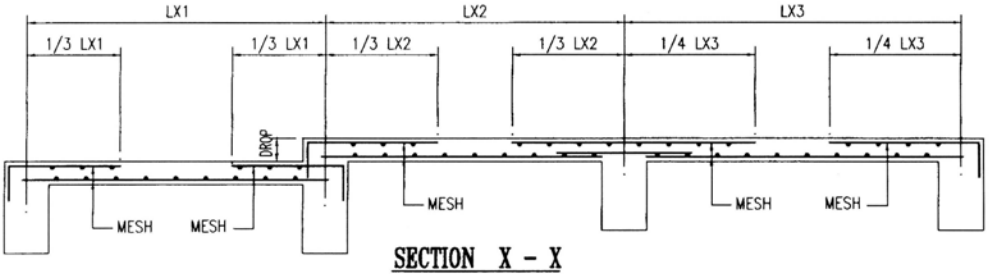
Main Wires



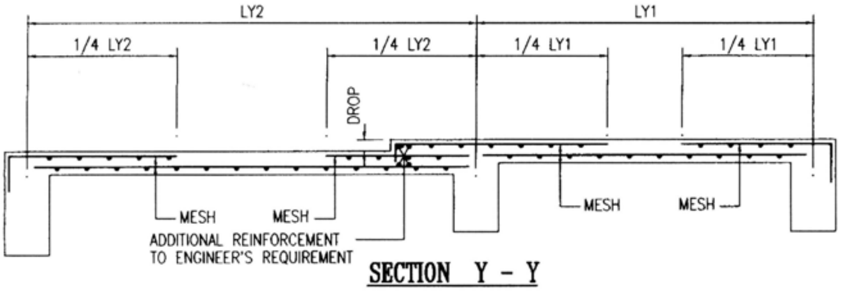
Cross Wires



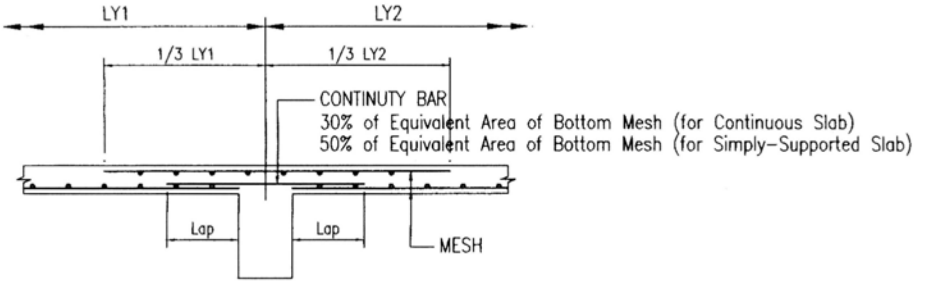
TYPICAL LAYOUT PLAN FOR ONE-WAY & TWO-WAY SLAB



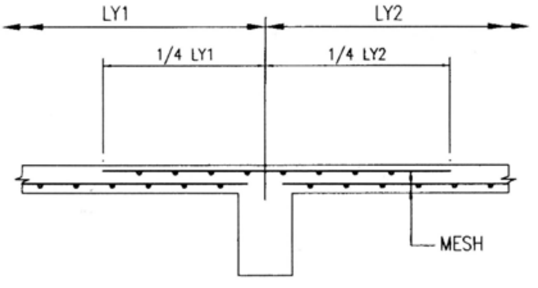
SECTION X - X



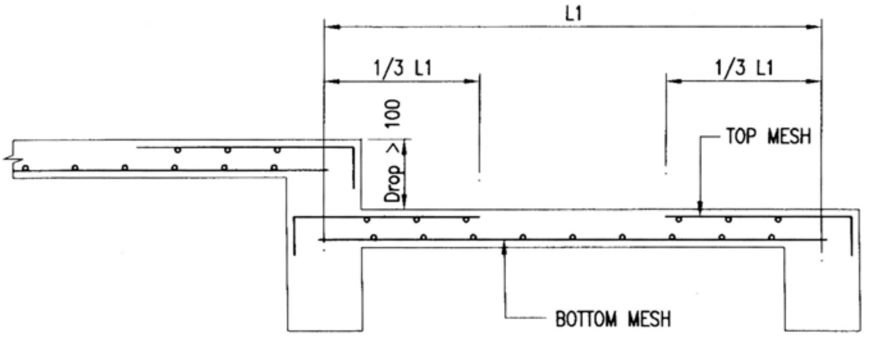
SECTION Y - Y



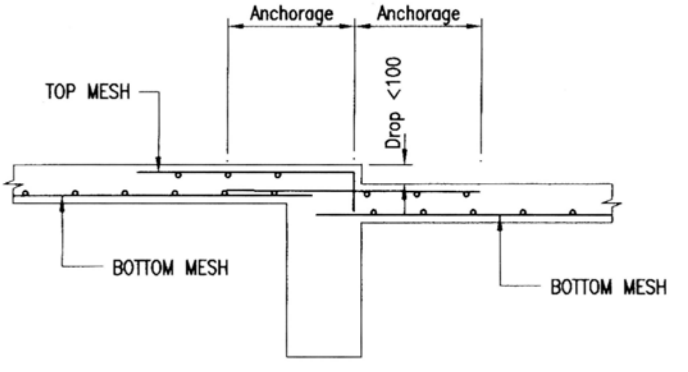
TYPICAL DETAIL OF CONTINUTY BAR IN THE MAIN DIRECTION
(For Bottom Mesh not anchoring into Beam)



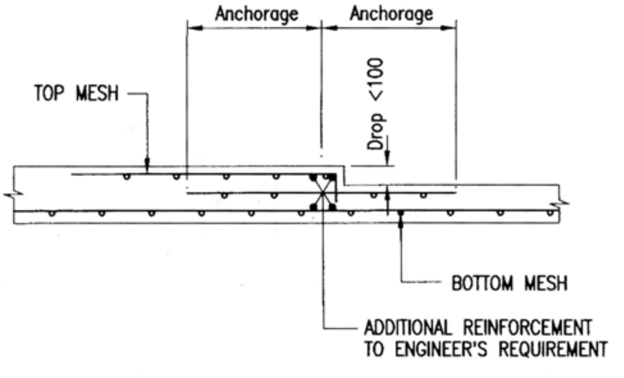
TYPICAL DETAIL IN THE SECONDARY DIRECTION
(For One-Way Slab)



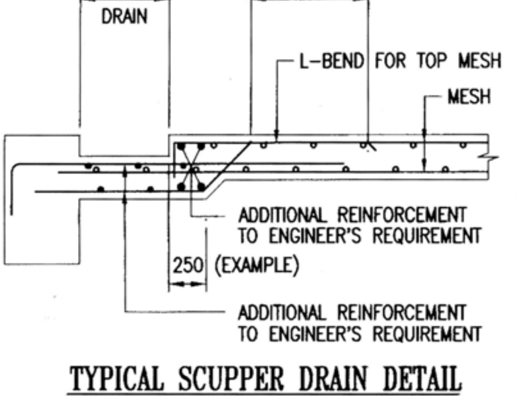
DROP > 100 AT SUPPORT



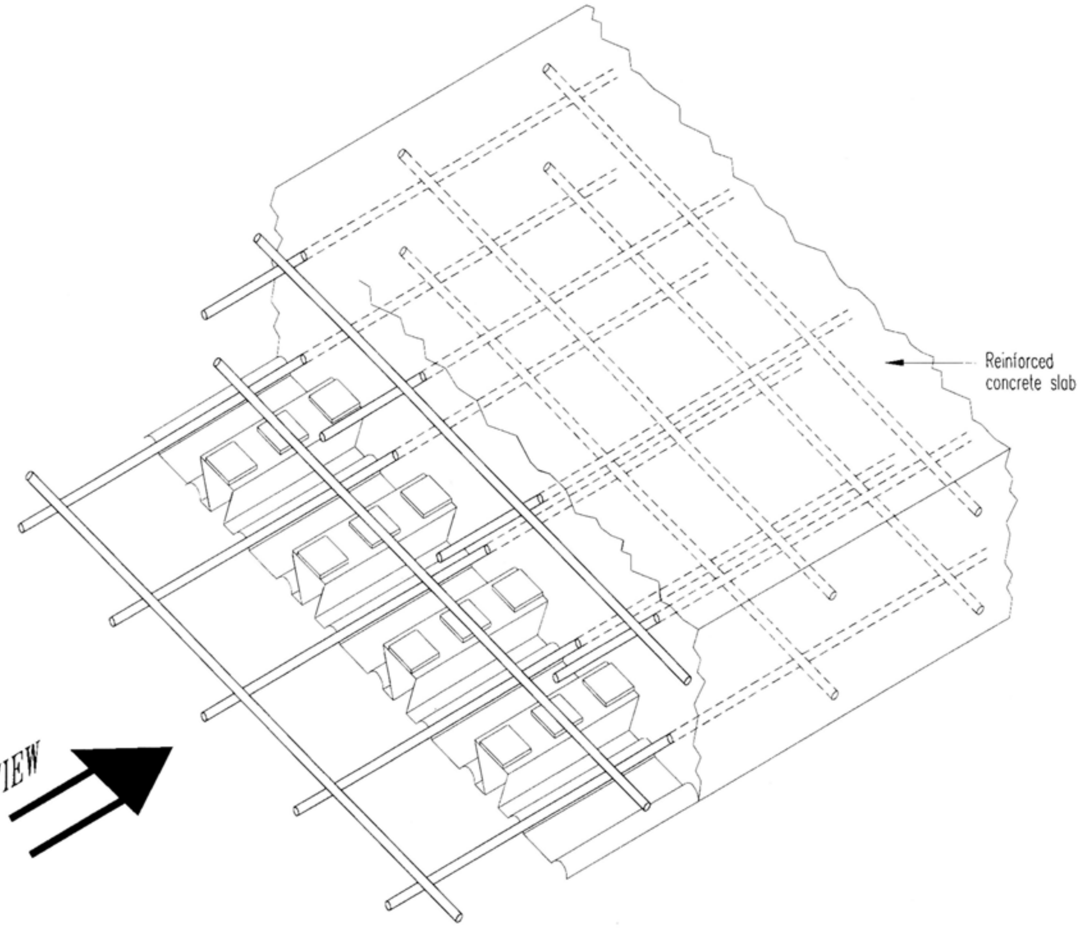
DROP ≤ 100 AT SUPPORT



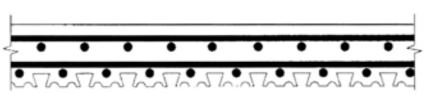
TYPICAL DETAIL OF DROP AT SLAB



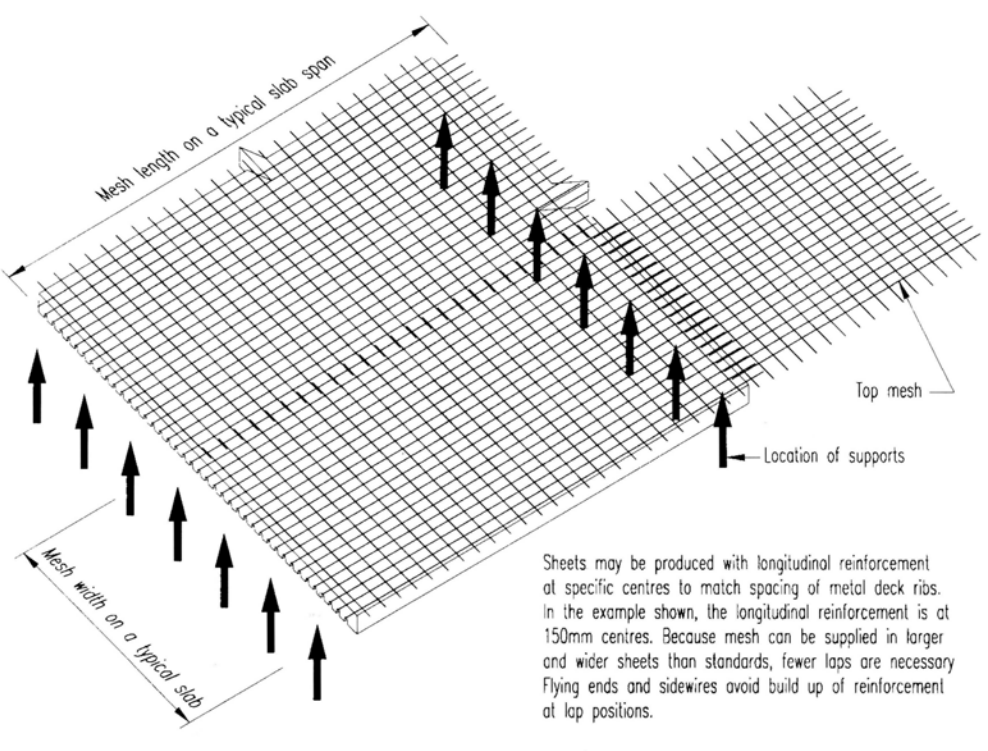
TYPICAL SCUPPER DRAIN DETAIL



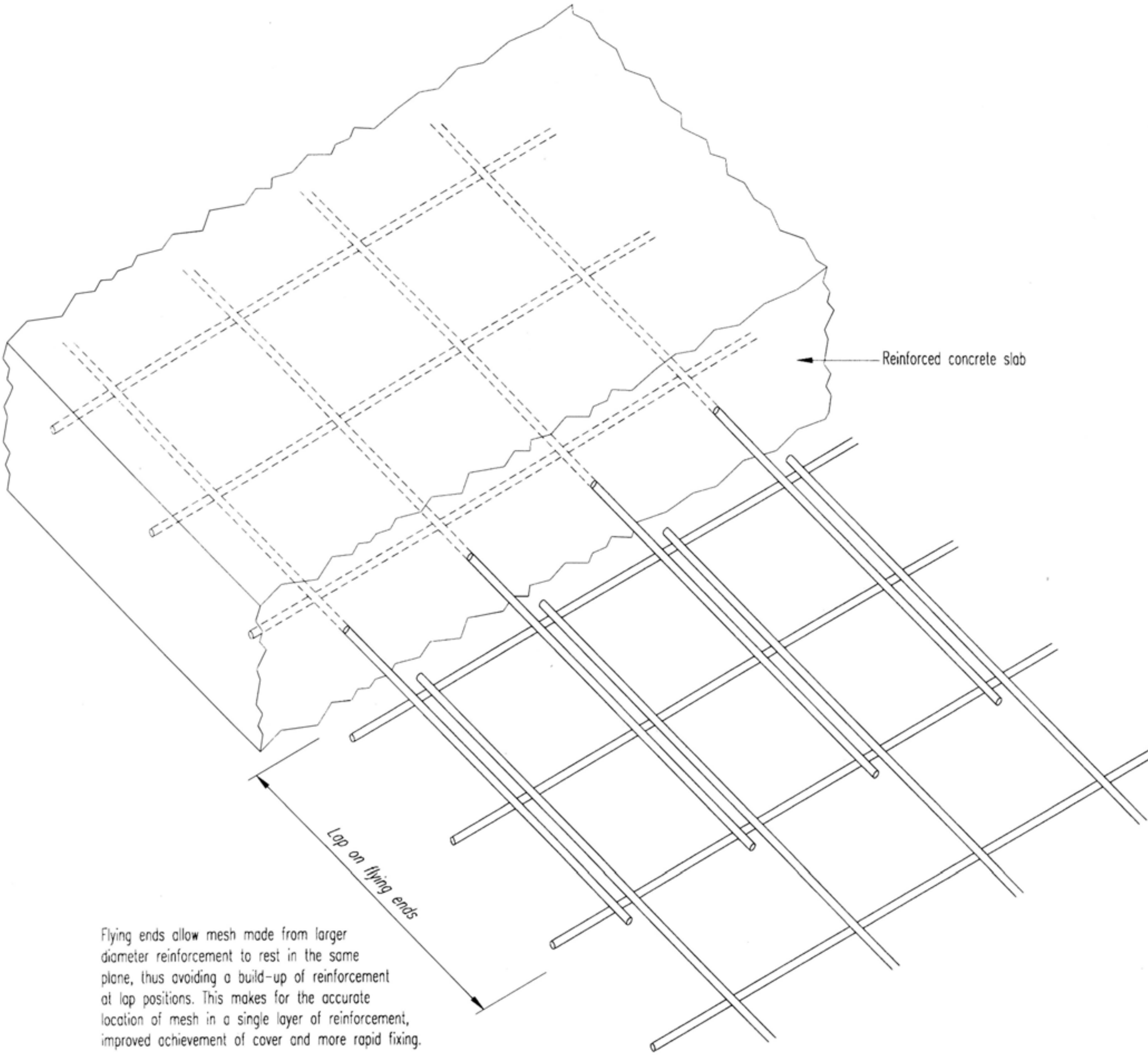
SUSPENDED SLABS



View through section

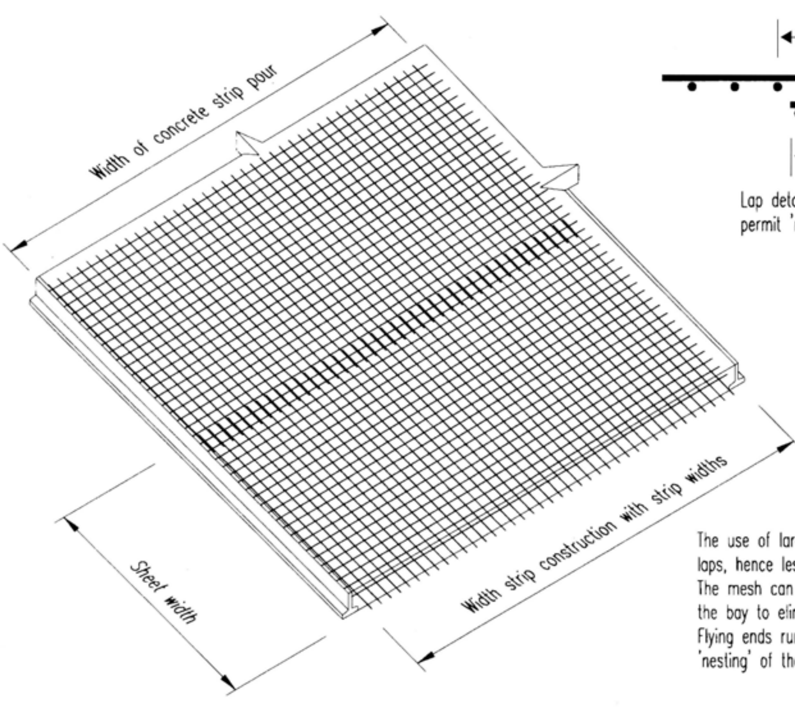


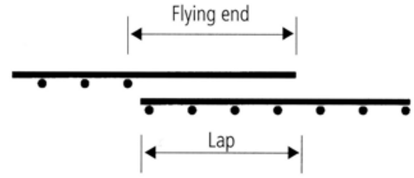
Sheets may be produced with longitudinal reinforcement at specific centres to match spacing of metal deck ribs. In the example shown, the longitudinal reinforcement is at 150mm centres. Because mesh can be supplied in larger and wider sheets than standards, fewer laps are necessary Flying ends and sidewires avoid build up of reinforcement at lap positions.



Flying ends allow mesh made from larger diameter reinforcement to rest in the same plane, thus avoiding a build-up of reinforcement at lap positions. This makes for the accurate location of mesh in a single layer of reinforcement, improved achievement of cover and more rapid fixing.

FLYING ENDS LAP DETAILS





Lap detail showing flying end to permit 'nesting' in the same plane

The use of larger mesh leads to fewer laps, hence less reinforcement is used. The mesh can be laid lengthways across the bay to eliminate longitudinal laps. Flying ends running down the bay allow 'nesting' of the mats.

SECTION TWO

BEAM REINFORCEMENT

SECTION TWO : BEAM REINFORCEMENT

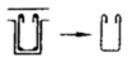
This Section provides guidelines on specifying prefabricated reinforcement link cages and capping links.

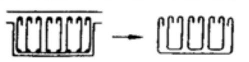
2.1 Design And Detailing Considerations

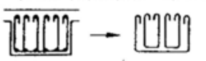
1. Annotation for beam link cage :-

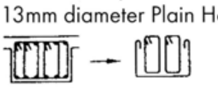
Link Type	Numbers of Link per Beam Cross-Section	Link Material	Link Diameter (mm)	-	Link Spacing, S_v (mm)
S, L	n	R, T, D, H	10, 13	-	75, 100, 125, 150, 200, 250, 300

For Specifying Beam Link Cage :-

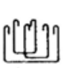
Example (1): S R 10 - 200 ====> detailed as 
consists of 1 number Open Link Cage of 10mm diameter Plain Mild Steel Bar at 200mm spacing.

Example (2): S 4 D 13 - 150 ====> detailed as 
consists of 4 number Open Link Cage of 13mm diameter Deformed Hard Drawn Wire at 150mm spacing.

Example (3): S 3 H 13 - 250 ====> detailed as 
consists of 3 number Open Link Cage of 13mm diameter Plain Hard Drawn Wire at 250mm spacing.

Example (4): L 3 T 10 - 250 ====> detailed as 
consists of 3 number Close Link Cage of 10mm diameter Tempcore Deformed Bar at 250mm spacing.

Notes:

(1) Internal beam links shall not overlap each others ==>  or 

(2) Digit "1" between alphabets "S" and "R" in Example (1) above is omitted and is not required when specifying 1 number link per beam cross-section.

2. Annotation for beam capping link :-

Open Link	Link Material	Link Diameter (mm)	-	Recommended Capping Link Spacing, S_v (mm)
S	R, T, D, H	10, 13	-	75, 100, 125, 150, 200, 250, 300

Example (1): S H 10 - 300
consists of 1 number top beam capping link of 10mm diameter Plain Hard Drawn Wire at 300mm spacing.

3. Legends :-
   (a) Prefix 'S' denotes open link cage (e.g. SR, ST, SD, SH)
   (b) Prefix 'L' denotes close link cage (e.g. LR, LT, LD, LH)
   (c) R' denotes links using Plan Mild Steel Bar (f_{yv} = 250 N/mm^2)
   (d) T' denotes links using Tempcore Deformed Bar (f_{yv} = 460 N/mm^2)
   (e) D' denotes links using Deformed Hard Drawn Wire (f_{yv} = 485 N/mm^2)
   (f) H' denotes links using Plain Hard Drawn Wire (f_{yv} = 485 N/mm^2)

4. Engineer shall avoid specifying link cage using Plain Mild Steel Bar, 'R' and Plain Hard Drawn Wire, 'H' to avoid confusion when applying.

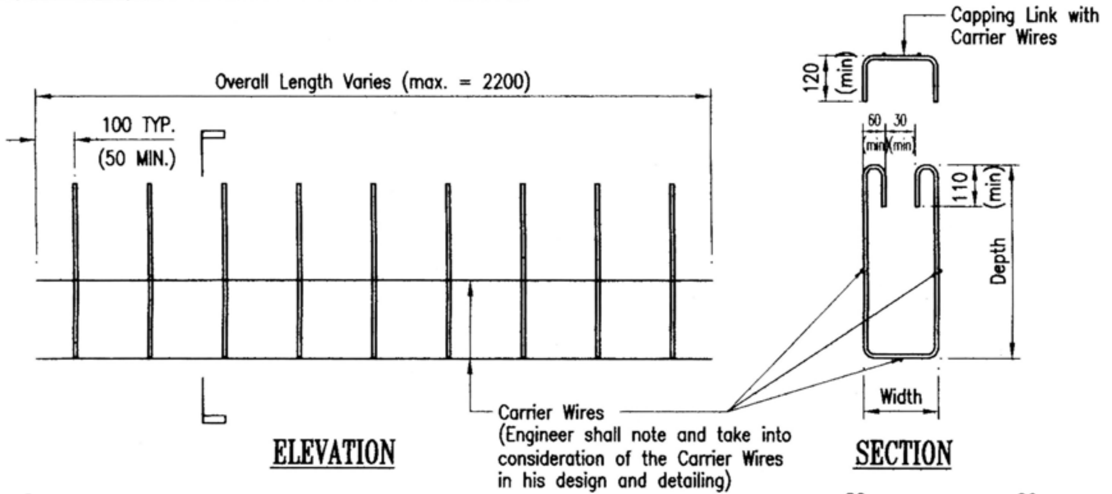
5. Engineer shall note and design accordingly the link cage when beam is subjected to torsion.

6. Conversion table of beam link cage for Plain Mild Steel Bar to other type of link material is shown in the Appendix.

7. When adopting for prefabricated reinforcement bars cage, engineer shall consider and liaise with fabricators, if necessary, to verify the feasible cage size, lapping and lifting requirements.

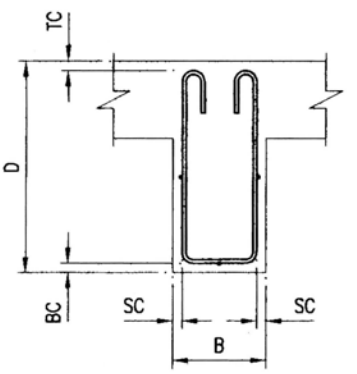
2.2 Illustration On Use Of Beam Cage

BEAM OPEN STIRRUP CAGE AND CAPPING LINK

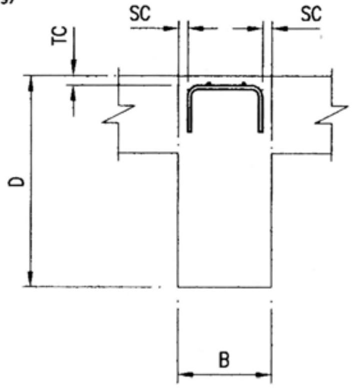


Legend

D = Beam Depth
B = Beam Width
TC = Top Cover
BC = Bottom Cover
SC = Side Cover = 25mm (minimum)
TC + BC = 85mm

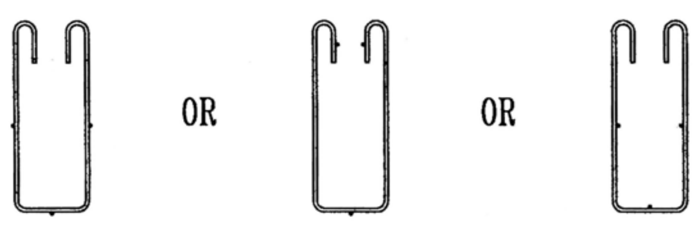


Position of Open Stirrup



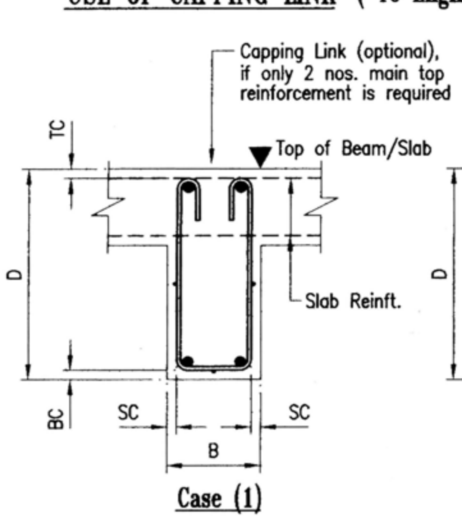
Position of Capping Link

POSITIONS OF CARRIER WIRES (To verify with supplier)

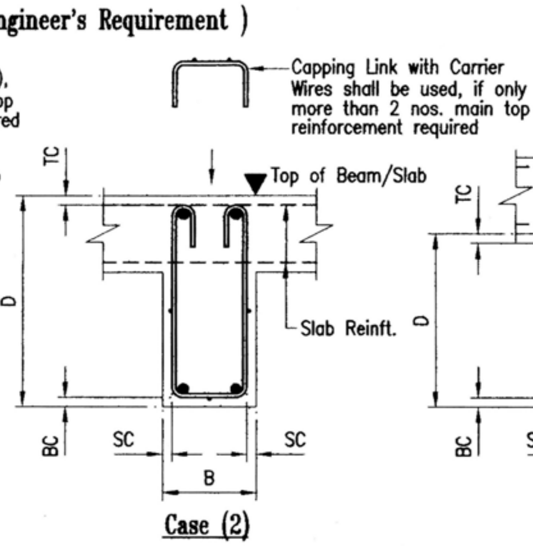


Position (1) Position (2) Position (3)

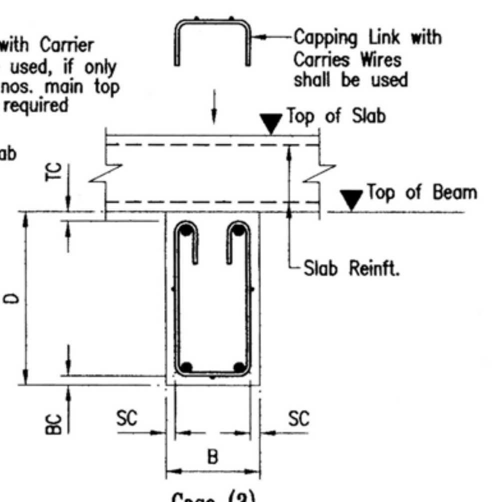
USE OF CAPPING LINK (To Engineer's Requirement)



Case (1)



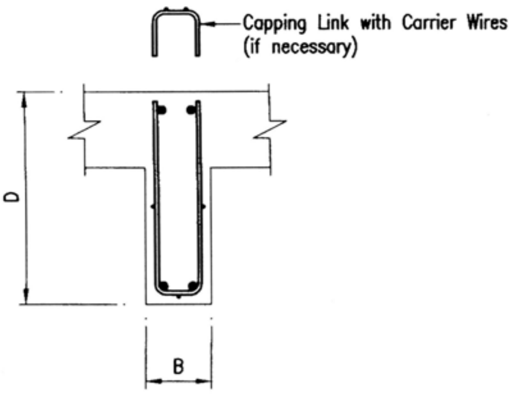
Case (2)



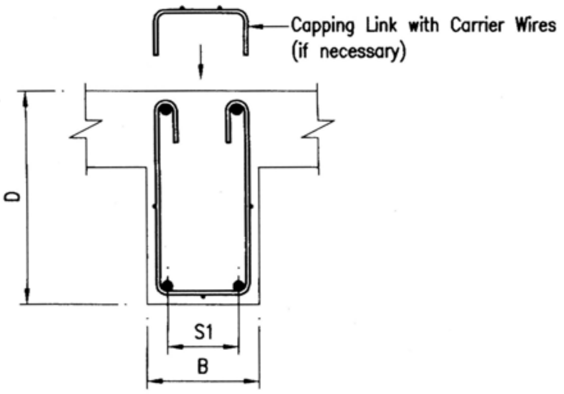
Case (3)

EXAMPLES OF BEAM OPEN LINK AND CAPPING LINK

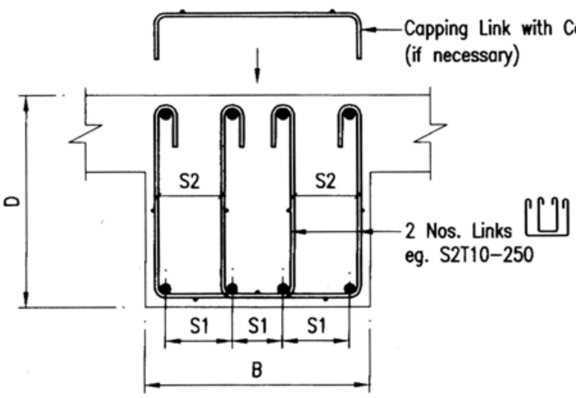
Example '1' (For B < 200mm)



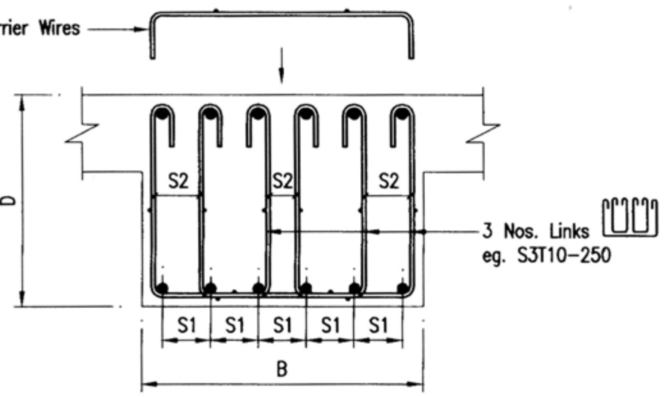
Example '2' (For 200mm ≤ B < 400mm)



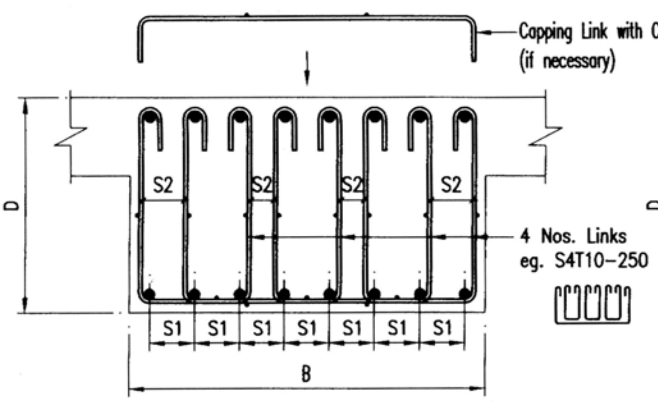
Example '3' (For 400mm ≤ B < 600mm)



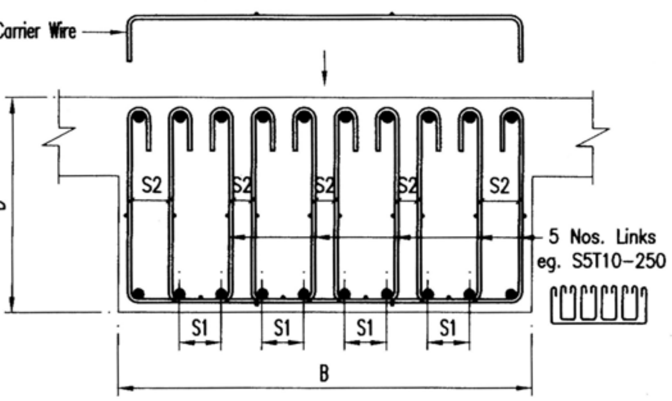
Example '4' (For 600mm < B ≤ 750mm)



Example '5' (For 750mm < B ≤ 950mm)



Example '6' (For 950mm < B ≤ 1100mm)



NOTE:

(1) Internal links shall not overlap as shown in the diagram.

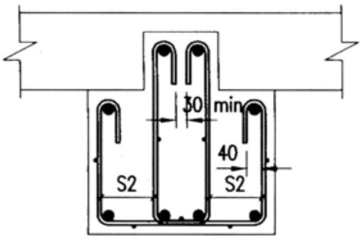
(2) Examples above indicate maximum numbers of link for a specific width of beam. Numbers of link required shall be determined by Engineer.

(3) Legend : S1 = Distance between tension bars shall not be greater than 160mm for zero percentage of moment distribution.

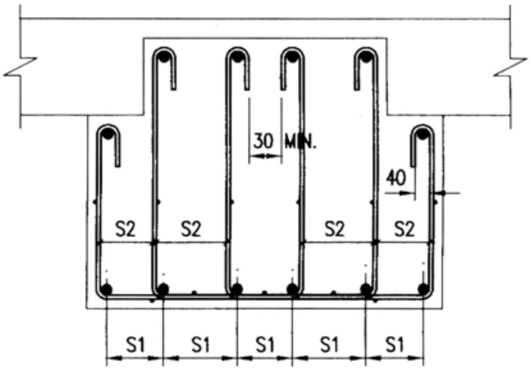
S2 = Maximum lateral spacing of link legs shall not more than effective beam depth.

EXAMPLES OF BEAM OPEN LINK AND CAPPING LINKS SUPPORTING PRECAST SLABS

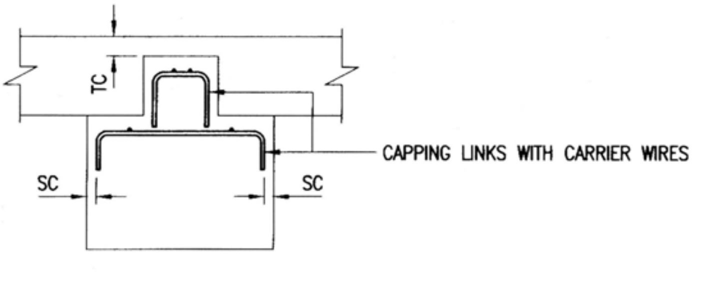
Example '1' : Double Link Cage System
(For Narrow Beam)



Example '2' : Multiple Link Cage System
(For Wide Beam)



Example '3' : Capping Link Cage

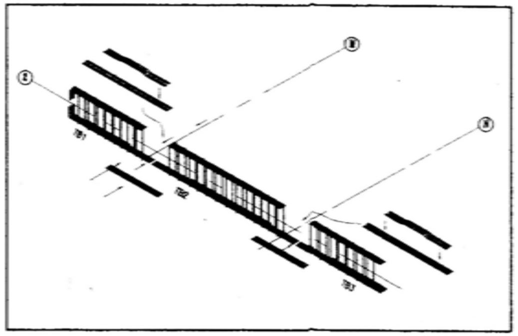


Legend : S1 = Distance between tension bars shall not be greater than 160mm for zero percentage of moment distribution.

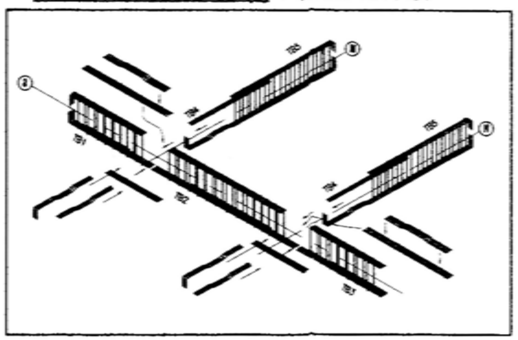
S2 = Maximum lateral spacing of link legs shall not more than effective beam depth.

2.3 Laying Sequence Of Prefabricated Beam Cage

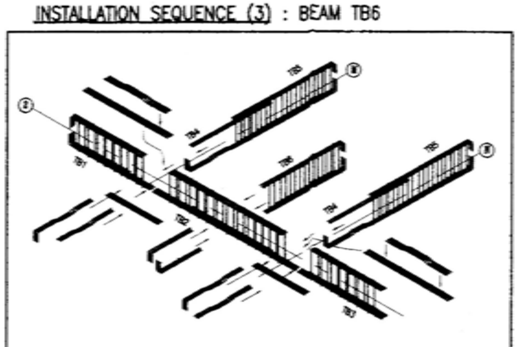
INSTALLATION SEQUENCE (1) : BEAMS TB1+TB2+TB3

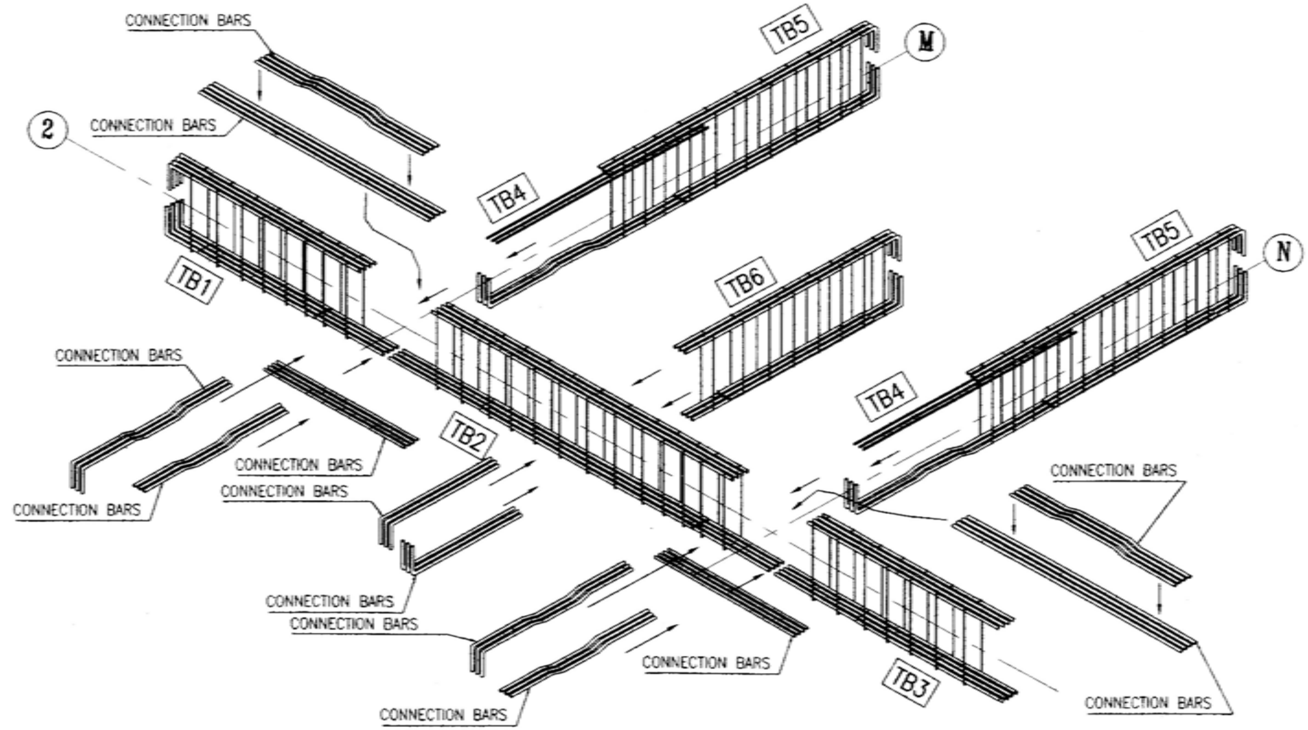


INSTALLATION SEQUENCE (2) : BEAMS TB4+TB5



INSTALLATION SEQUENCE (3) : BEAM TB6

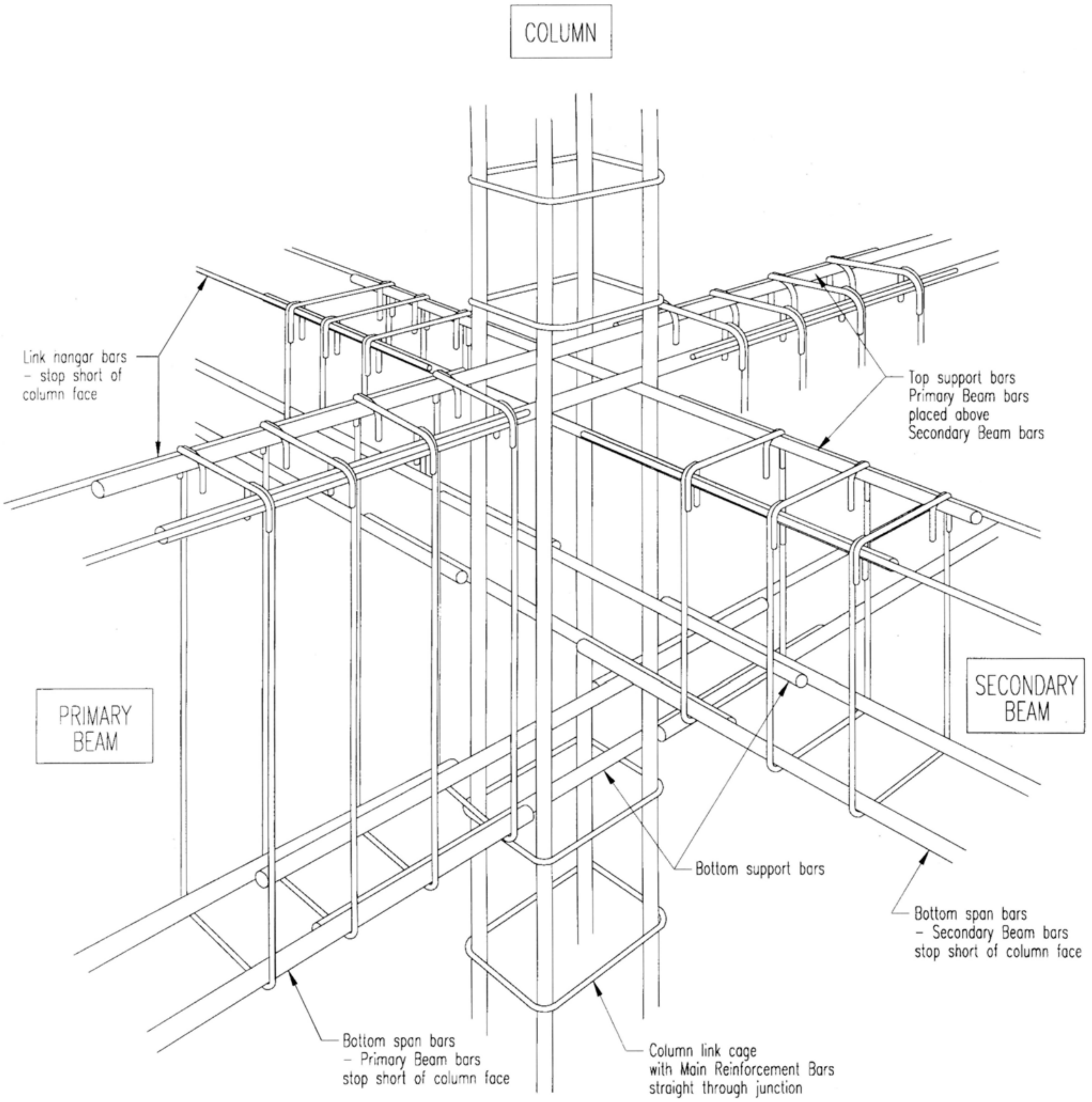




SECTION THREE

COLUMN REINFORCEMENT

2.4 Bean-Column Intersection Detail



BEAM-COLUMN INTERSECTION DETAIL

SECTION THREE : COLUMN REINFORCEMENT

This Section enables engineer to specify from the design tables, column link cage for various sizes of column using T13 and T16 as the main vertical reinforcement bars. T16 diameter bar is the maximum bar size which is currently available by machine fabrication. Larger bar size can be introduced by manual fabrication.

The link cage can also be used independently without the main reinforcement bars if so desired.

To achieve higher column capacity, engineer may install additional vertical reinforcement bars to the cage and/or use higher grades of concrete.

3.1 Design Considerations

1. Annotation for column reference number with its specific steel reinforcement cage are shown in the following examples.

   Example (1): CA25/25-T1 from Column Design Table 'CA2', where,

   CA – Denotes reinforced concrete column designed based on Grade 30 concrete

   25/25 – Denotes 250mm x 250mm reinforced concrete square column

   T1 – Denotes specific main vertical reinforcement bars 4T13 with 1 number complete close link indicated as LR8-150 are used

   Example (2): CA35/60-T6 from Column Design Table 'CA24', where,

   CA – Denotes rectangular reinforced concrete column designed based on Grade 30 concrete

   35/60 – Denotes 350mm x 600mm reinforced concrete rectangular column

   T6 – Denotes specific main vertical reinforcement bars 14T16 with 1 number complete close link and 2 numbers "C" link indicated as 3LR8-175 are used

2. The derivation of Design Ultimate Vertical Load, N (in kN) in the design tables is in accordance to Clause (3.8.4.4) in BS 8110: Part 1: 1985: Section Three for short braced column supporting an approximately symmetrical arrangement of beams, and assumed to be pinned at each floor. Engineer shall exercise his own judgement when using the design tables such as when bending or unbraced condition is to be taken into consideration.

$$\mathbf{N\ (in\ kN) = 0.35\ f_{cu}\ A_c + 0.67\ A_{sc}\ f_y}$$

   where,

   f_{cu} – Denotes characteristic strength of concrete used (N/mm^2)

   A_c – Denotes net cross-section area of concrete in a column (mm^2)

   A_{sc} – Denotes area of main vertical reinforcement bars (mm^2)

   f_y – Denotes characteristic strength of steel reinforcement bars (460 N/mm^2)

3. Annotation for column link cage :-

Numbers of Link	Close Link	Link Material	Link Diameter (mm)	-	Link Spacing, S_v (mm)
n	L	R, D, H	6, 8, 10, 13	-	100, 125, 150, 200, 250, 300

Example (1): L R 10 - 200
consists of 1 number complete close link cage of 10mm diameter Plain Mild Steel Bar at 200mm spacing.

Example (2): 3 L D 13 - 150
consists of 1 number complete close link cage and 2 numbers "C" link of 13mm diameter Deformed Hard Drawn Wire at 150mm spacing.

Example (3): 6 L H 8 - 125
consists of 1 number complete close link cage and 5 numbers "C" link of 8mm diameter Plain Hard Drawn Wire at 125mm spacing.

NOTE :- "C" link is considered as one link in the annotation above.

4. 30mm nominal concrete cover and 30 N/mm^2 concrete characteristic strength are adopted in the design for Table 'CA1' to Table 'CA25'.

5. Steel/Concrete content (in kg/m^3) and its percentage are an estimated values without taking into account of lapping zone.

6. Engineer shall consider and liaise with fabricators, if necessary, for any other column cage, and to verify the feasible cage size, lapping and lifting requirements.

7. Conversion table for plain mild steel bar to other type of link material cage is shown in the Appendix.

3.2 Column Design Tables

Column Design Table: CA1			Column Size: 200 mm x 200 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/20-T1	4T13	531	1.33	LR8-150	580	151
CA20/20-T2	4T16	804	2.01	LR8-175	660	198

Column Design Table: CA2			Column Size: 250 mm x 250 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/25-T1	4T13	531	0.85	LR8-150	810	105
CA25/25-T2	4T16	804	1.29	LR8-175	900	134

Column Design Table: CA3			Column Size: 300 mm x 300 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA30/30-T1	4T13	531	0.59	LR8-150	1100	79
CA30/30-T2	6T13	796	0.88	LR8-150	1180	102
CA30/30-T3	8T16	1062	1.18	LR8-150	1260	125
CA30/30-T4	4T16	804	0.89	LR8-175	1180	98
CA30/30-T5	6T16	1206	1.34	LR8-175	1300	133
CA30/30-T6	8T16	1608	1.79	LR8-175	1420	168

Column Design Table: CA4			Column Size: 350 mm x 350mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA35/35-T1	4T13	531	0.43	LR8-150	1440	62
CA35/35-T2	6T13	796	0.65	LR8-150	1520	79
CA35/35-T3	8T13	1062	0.87	LR8-150	1600	96
CA35/35-T4	4T16	804	0.66	LR8-175	1530	76
CA35/35-T5	6T16	1206	0.98	LR8-175	1650	102
CA35/35-T6	8T16	1608	1.31	LR8-175	1770	127

Column Design Table: CA5			Column Size: 400 mm x 400 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA40/40-T1	8T13	1062	0.66	LR8-150	2000	77
CA40/40-T2	12T13	1593	1.00	LR8-150	2150	103
CA40/40-T3	4T16	804	0.50	LR8-175	1920	61
CA40/40-T4	8T16	1608	1.01	LR8-175	2160	100
CA40/40-T5	12T16	2413	1.51	LR8-175	2400	140

Column Design Table: CA6			Column Size: 450 mm x 450 mm Concrete Grade: 30 N/mm²			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm²)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m³)
CA45/45-T1	8T13	1062	0.52	LR8-150	2440	63
CA45/45-T2	12T13	1593	0.79	LR8-150	2600	84
CA45/45-T3	4T16	804	0.40	LR8-175	2370	50
CA45/45-T4	8T16	1608	0.79	LR8-175	2610	82
CA45/45-T5	12T16	2413	1.19	LR8-175	2840	113

Column Design Table: CA7			Column Size: 500 mm x 500 mm Concrete Grade: 30 N/mm²			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm²)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m³)
CA50/50-T1	8T13	1062	0.42	3 LR8-150	2940	63
CA50/50-T2	12T13	1593	0.64	3 LR8-150	3100	80
CA50/50-T3	16T13	2124	0.85	3 LR8-150	3260	96
CA50/50-T4	8T16	1608	0.64	3 LR8-175	3100	76
CA50/50-T5	12T16	2413	0.97	3 LR8-175	3340	101
CA50/50-T6	16T16	3217	1.29	3 LR8-175	3580	127

Column Design Table: CA8			Column Size: 600 mm x 600 mm Concrete Grade: 30 N/mm²			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm²)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m³)
CA60/60-T1	12T13	1593	0.44	5 LR8-150	4250	68
CA60/60-T2	16T13	2124	0.59	5 LR8-150	4410	80
CA60/60-T3	20T13	2655	0.74	5 LR8-150	4570	91
CA60/60-T4	8T16	1608	0.45	5 LR8-175	4260	57
CA60/60-T5	12T16	2413	0.67	5 LR8-175	4500	81
CA60/60-T6	16T16	3217	0.89	5 LR8-175	4740	99
CA60/60-T7	20T16	4021	1.12	5 LR8-175	4980	116

Column Design Table: CA9			Column Size: 200 mm x 400 mm Concrete Grade: 30 N/mm²			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm²)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m³)
CA20/40-T1	4T13	531	0.66	LR8-150	1000	89
CA20/40-T2	8T13	1062	1.33	LR8-150	1160	141
CA20/40-T3	4T16	804	1.01	LR8-175	1080	110
CA20/40-T4	8T16	1608	2.01	LR8-175	1320	189

Column Design Table: CA10			Column Size: 200 mm x 500 mm			
			Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/50-T1	6T13	796	0.80	2 LR8-150	1290	102
CA20/50-T2	10T13	1327	1.33	2 LR8-150	1450	144
CA20/50-T3	6T16	1206	1.21	2 LR8-175	1410	129
CA20/50-T4	10T16	2011	2.01	2 LR8-175	1650	192

Column Design Table: CA11			Column Size: 200 mm x 600 mm			
			Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/60-T1	8T13	1062	0.88	3 LR8-150	1580	112
CA20/60-T2	12T13	1593	1.33	3 LR8-150	1730	146
CA20/60-T3	8T16	1608	1.34	3 LR8-175	1740	142
CA20/60-T4	12T16	2413	2.01	3 LR8-175	1980	194

Column Design Table: CA12			Column Size: 200 mm x 700 mm			
			Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/70-T1	8T13	1062	0.76	3 LR8-150	1790	99
CA20/70-T2	10T13	1327	0.95	3 LR8-150	1870	114
CA20/70-T3	14T13	1858	1.33	3 LR8-150	2020	144
CA20/70-T4	8T16	1608	1.15	3 LR8-175	1950	125
CA20/70-T5	10T16	2011	1.44	3 LR8-175	2070	147
CA20/70-T6	14T16	2815	2.01	3 LR8-175	2310	192

Column Design Table: CA13			Column Size: 200 mm x 800 mm			
			Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/80-T1	8T13	1062	0.66	3 LR8-150	2000	90
CA20/80-T2	12T13	1593	1.00	3 LR8-150	2150	116
CA20/80-T3	16T13	2124	1.33	3 LR8-150	2310	142
CA20/80-T4	8T16	1608	1.01	3 LR8-175	2160	112
CA20/80-T5	12T16	2413	1.51	3 LR8-175	2400	151
CA20/80-T6	16T16	3217	2.01	3 LR8-175	2640	191

Column Design Table: CA14			Column Size: 200 mm x 1000 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA20/100-T1	12T13	1593	0.80	5 LR8-150	2570	104
CA20/100-T2	16T13	2124	1.06	5 LR8-150	2730	125
CA20/100-T3	20T13	2655	1.33	5 LR8-150	2890	145
CA20/100-T4	12T16	2413	1.21	5 LR8-175	2820	130
CA20/100-T5	16T16	3217	1.61	5 LR8-175	3060	162
CA20/100-T6	20T16	4021	2.01	5 LR8-175	3300	193

Column Design Table: CA15			Column Size: 250 mm x 400 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/40-T1	4T13	531	0.53	LR8-150	1210	74
CA25/40-T2	8T13	1062	1.06	LR8-150	1370	115
CA25/40-T3	4T16	804	0.80	LR8-175	1290	91
CA25/40-T4	8T16	1608	1.61	LR8-175	1530	154

Column Design Table: CA16			Column Size: 250 mm x 500 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/50-T1	6T13	796	0.64	2 LR8-150	1550	85
CA25/50-T2	10T13	1327	1.06	2 LR8-150	1710	118
CA25/50-T3	6T16	1206	0.97	2 LR8-175	1670	106
CA25/50-T4	10T16	2011	1.61	2 LR8-175	1910	157

Column Design Table: CA17			Column Size: 250 mm x 600 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/60-T1	8T13	1062	0.71	3 LR8-150	1890	93
CA25/60-T2	12T13	1593	1.06	3 LR8-150	2050	121
CA25/60-T3	8T16	1608	1.07	3 LR8-175	2050	116
CA25/60-T4	12T16	2413	1.61	3 LR8-175	2290	158

Column Design Table: CA18			Column Size: 250 mm x 700 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/70-T1	8T13	1062	0.61	3 LR8-150	2150	83
CA25/70-T2	10T13	1327	0.76	3 LR8-150	2230	94
CA25/70-T3	14T13	1858	1.06	3 LR8-150	2390	118
CA25/70-T4	8T16	1608	0.92	3 LR8-175	2320	102
CA25/70-T5	10T16	2011	1.15	3 LR8-175	2440	120
CA25/70-T6	14T16	2815	1.61	3 LR8-175	2680	156

Column Design Table: CA19			Column Size: 250 mm x 800 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/80-T1	8T13	1062	0.53	3 LR8-150	2420	75
CA25/80-T2	12T13	1593	0.80	3 LR8-150	2570	96
CA25/80-T3	16T13	2124	1.06	3 LR8-150	2730	117
CA25/80-T4	8T16	1608	0.80	3 LR8-175	2580	92
CA25/80-T5	12T16	2413	1.21	3 LR8-175	2820	123
CA25/80-T6	16T16	3217	1.61	3 LR8-175	3060	155

Column Design Table: CA20			Column Size: 250 mm x 1000 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA25/100-T1	12T13	1593	0.64	5 LR8-150	3100	86
CA25/100-T2	16T13	2124	0.85	5 LR8-150	3260	103
CA25/100-T3	20T13	2655	1.06	5 LR8-150	3420	119
CA25/100-T4	12T16	2413	0.97	5 LR8-175	3340	107
CA25/100-T5	16T16	3217	1.29	5 LR8-175	3580	132
CA25/100-T6	20T16	4021	1.61	5 LR8-175	3820	157

Column Design Table: CA21			Column Size: 300 mm x 500 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA30/50-T1	6T13	796	0.53	2 LR8-150	1810	74
CA30/50-T2	10T13	1327	0.88	2 LR8-150	1970	101
CA30/50-T3	12T13	1593	1.06	2 LR8-150	2050	115
CA30/50-T4	6T16	1206	0.80	2 LR8-175	1930	91
CA30/50-T5	10T16	2011	1.34	2 LR8-175	2170	133
CA30/50-T6	12T16	2413	1.61	2 LR8-175	2290	154

Column Design Table: CA22			Column Size: 300 mm x 600 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA30/60-T1	8T13	1062	0.59	3 LR8-150	2210	80
CA30/60-T2	12T13	1593	0.88	3 LR8-150	2360	103
CA30/60-T3	14T13	1858	1.03	3 LR8-150	2440	115
CA30/60-T4	8T16	1608	0.89	3 LR8-175	2370	99
CA30/60-T5	12T16	2413	1.34	3 LR8-175	2610	135
CA30/60-T6	14T16	2815	1.56	3 LR8-175	2730	152

Column Design Table: CA23			Column Size: 350 mm x 500 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA35/50-T1	6T13	796	0.46	2 LR8-150	2070	65
CA35/50-T2	10T13	1327	0.76	2 LR8-150	2230	89
CA35/50-T3	12T13	1593	0.91	2 LR8-150	2310	101
CA35/50-T4	6T16	1206	0.69	2 LR8-175	2200	80
CA35/50-T5	10T16	2011	1.15	2 LR8-175	2440	116
CA35/50-T6	12T16	2413	1.38	2 LR8-175	2560	134

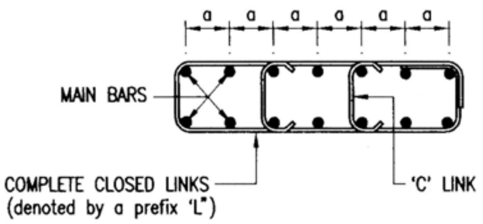
Column Design Table: CA24			Column Size: 350 mm x 600 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA35/60-T1	8T13	1062	0.51	3 LR8-150	2520	71
CA35/60-T2	12T13	1593	0.76	3 LR8-150	2680	91
CA35/60-T3	14T13	1858	0.88	3 LR8-150	2760	101
CA35/60-T4	8T16	1608	0.77	3 LR8-175	2680	87
CA35/60-T5	12T16	2413	1.15	3 LR8-175	2920	117
CA35/60-T6	14T16	2815	1.34	3 LR8-175	3040	133

Column Design Table: CA25			Column Size: 450 mm x 600 mm Concrete Grade: 30 N/mm^2			
Column Ref.No.	Vert Reinf Prov'd	Asc (prov'd) (mm^2)	Asc (prov'd) (%)	Link Cage Prov'd	Ult Vert Load Capacity (kN)	Steel/Concrete Prov'd (kg/m^3)
CA45/60-T1	12T13	1593	0.59	5 LR8-150	3310	85
CA45/60-T2	16T13	2124	0.79	5 LR8-150	3470	101
CA45/60-T3	12T16	2413	0.89	5 LR8-175	3550	104
CA45/60-T4	16T16	3217	1.19	5 LR8-175	3790	127

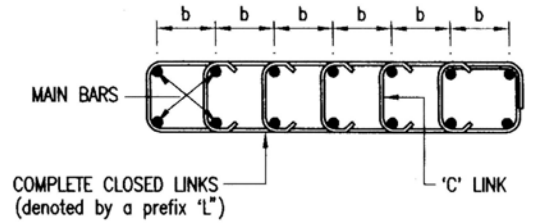
3.3 Illustration On Use Of Column Cage

REQUIREMENT OF COLUMN LINK CAGE

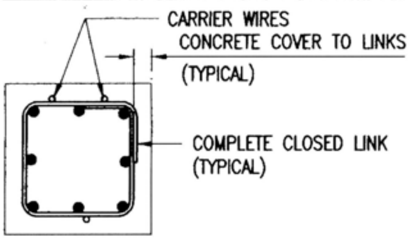
1. ALTERNATE OUTER MAIN BARS SHALL BE TIED BY 'C' LINKS IF THE SPACING ARE EQUAL OR LESS THAN 150mm (FOR a ≤ 150mm)

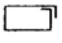


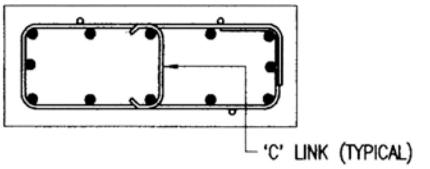
2. ALL ALTERNATE MAIN BARS SHALL BE TIED BY 'C' LINKS IF THE SPACING EXCEEDS 150mm (FOR b > 150mm)



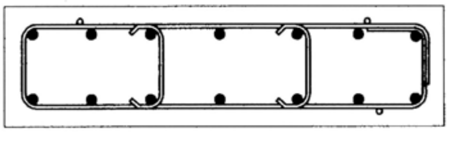
EXAMPLES OF COLUMN LINK CAGE

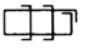


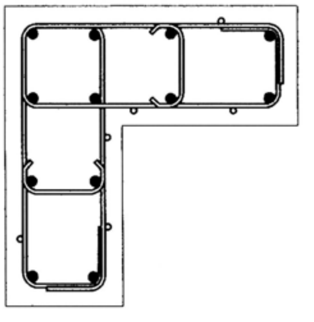
Example '1'
Single Column Link Cage
CONSISTS OF ONE COMPLETE CLOSED LINK
(e.g. LR10–200) 

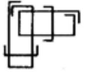


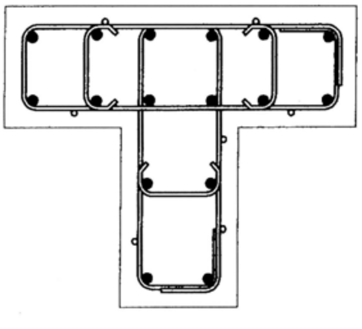
Example '2'
Double Column Link Cage
CONSISTS OF ONE COMPLETE CLOSED LINK AND ONE 'C' LINK
(e.g. 2LD8–200) 

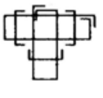


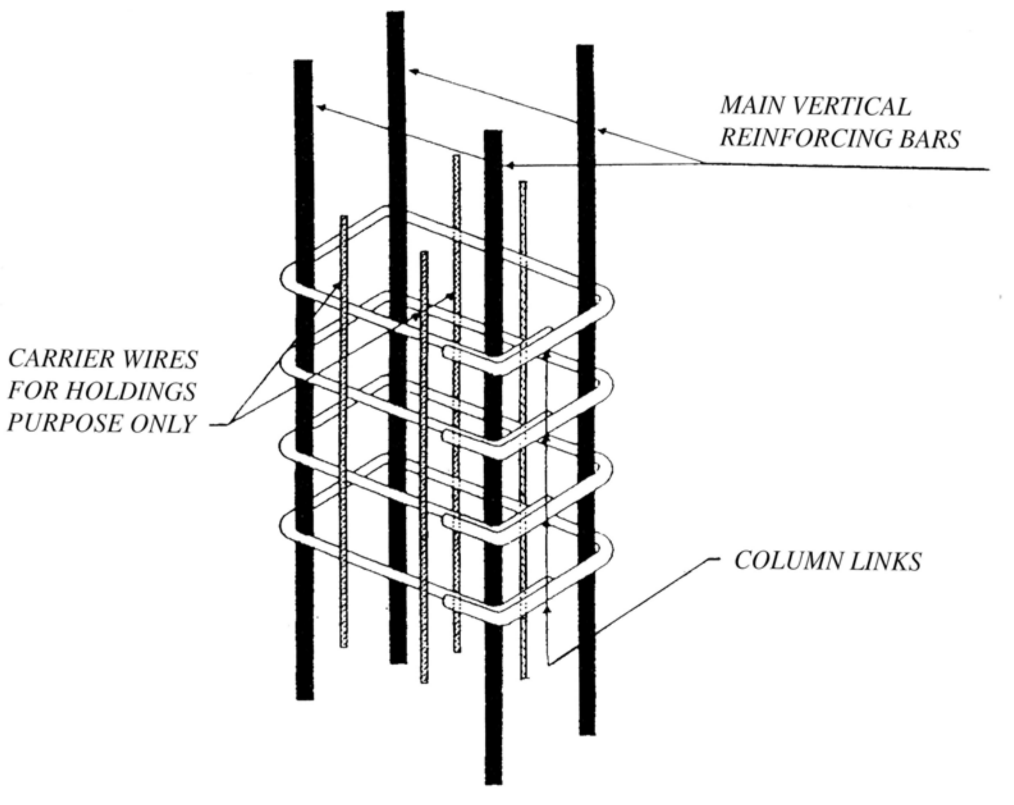
Example '3'
Triple Column Link Cage
CONSISTS OF ONE COMPLETE CLOSED LINK AND TWO 'C' LINKS
(e.g. 3LH10–175) 



Example '4'
Two "Interlocking" Column Link Cages for L-Shaped Columns
CONSISTS OF TWO COMPLETE CLOSED LINKS AND TWO 'C' LINKS
(e.g. 4LH10–250) 



Example '5'
Two "Interlocking" Column Link Cages for T-Shaped Columns
CONSISTS OF TWO COMPLETE CLOSED LINKS AND THREE 'C' LINKS
(e.g. 5LD13–150) 



NOTE :

MAIN VERTICAL REINFORCEMENT BARS CAN BE FURTHER INCORPORATED WITHIN THE COLUMN CAGE IF NEED ARISES TO INCREASE THE COLUMN LOAD CAPACITY

SECTION FOUR

WALL REINFORCEMENT

SECTION FOUR : WALL REINFORCEMENT

This Section enables engineer to specify from the design tables, a new range of WWF for various sizes of reinforced concrete walls. Only 10mm and 13mm diameter of bars with 150mm and 200mm spacing in either main, cross or both directions of the welded wire fabric series are considered in the design.

Other mesh series if required may be used subject to the engineer's requirement.

To achieve high load capacity, engineer may install additional vertical reinforcement bars to the mesh and/or use higher grades of concrete.

4.1 Design Considerations

1. Annotation for wall reference number with its specific mesh are shown in the following examples.

   Example (1): WA125-A10 from Building Wall Design Table 'WA1', where,
   W – Denotes reinforced concrete wall
   A – Denotes wall design based on Grade 30 concrete
   125 – Denotes 125mm thick reinforced concrete wall
   A10 – Denotes A10 Standard WWF is used for both sides of wall

   Example (2): WB300-DA13d/10 from Building Wall Design Table 'WB5', where,
   W – Denotes reinforced concrete wall
   B – Denotes wall design based on Grade 35 concrete
   300 – Denotes 300mm thick reinforced concrete wall
   DA13d/10 – Denotes DA13d/10 Designer WWF is used for both sides of wall

2. Nominal concrete cover of 25mm is used in the design unless otherwise specified by engineer.

3. Concrete characteristic strength of 30 N/mm^2 and 35 N/mm^2 are adopted in the Design Table 'WA1' to Table 'WA8' and Table 'WB1' to Table 'WB8' respectively.

4. The derivation of Design Ultimate Vertical Load, N (in kN) in the design table is in accordance to Clause (3.9.3.6.1) in BS 8110: Part 1: 1985: Section Three for stocky braced reinforced wall supporting approximately symmetrical arrangement of slabs and beams, and assumed to be pinned at each floor. Engineer shall exercise his own judgement when using the design tables such as when bending or unbraced condition is to be taken into consideration.

   $$\mathbf{N\ (in\ kN) = 0.35\ f_{cu}\ A_c + 0.67\ A_{sc}\ f_y}$$

   where,
   f_{cu} – Denotes characteristic strength of concrete used (N/mm^2)
   A_c – Denotes net cross-section area of concrete in a column (mm^2)
   A_{sc} – Denotes area of main vertical reinforcement bars (mm^2)
   f_y – Denotes characteristic strength of welded wire fabric wires (485 N/mm^2)

5. "C" links are to be provided and specified by Engineer whenever necessary.

6. Steel/Concrete content (in kg/m^3) and its percentage are an estimated values without taking into account of lapping zone.

7. Engineer shall consider and liaise with fabricators, whenever necessary, for any other available mesh, and to verify the necessary lapping and lifting requirements.

4.2 Wall Design Tables

Building Wall Design Table: WA1			Thickness: 125 mm		
			Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf**	**% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA125-A10	A10	1560	0.63	0.63	99
WA125-AA13/10	AA13/10	1730	1.06	0.63	133
WA125-DA10/10	DA10/10	1810	1.26	0.63	148
WA125-EA13/10	EA13/10	1900	1.49	0.63	160
WA125-EA10d/10	EA10d/10	2000	1.76	0.63	181
WA125-B13	B13	2150	2.12	0.63	216
WA125-DA10d/10	DA10d/10	2300	2.51	0.63	247
WA125-EA13d/10	EA13d/10	2480	2.97	0.63	271
WA125-DA13d/10	DA13d/10	2980	4.25	0.63	382

Building Wall Design Table: WA2			Thickness: 150 mm		
			Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf**	**% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA150-A10	A10	1820	0.52	0.52	82
WA150-AA13/10	AA13/10	1990	0.88	0.52	110
WA150-DA10/10	DA10/10	2070	1.05	0.52	123
WA150-EA13/10	EA13/10	2160	1.24	0.52	134
WA150-EA10d/10	EA10d/10	2270	1.47	0.52	151
WA150-B13	B13	2410	1.77	0.52	180
WA150-DA10d/10	DA10d/10	2560	2.09	0.52	206
WA150-EA13d/10	EA13d/10	2740	2.48	0.52	226
WA150-DA13d/10	DA13d/10	3240	3.54	0.52	318

Building Wall Design Table: **WA3**		Thickness: 175 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA175-A10	A10	2080	0.45 / 0.45	71
WA175-AA13/10	AA13/10	2250	0.76 / 0.45	95
WA175-DA10/10	DA10/10	2330	0.90 / 0.45	106
WA175-EA13/10	EA13/10	2420	1.06 / 0.45	114
WA175-EA10d/10	EA10d/10	2530	1.26 / 0.45	129
WA175-B13	B13	2670	1.52 / 0.45	154
WA175-DA10d/10	DA10d/10	2830	1.80 / 0.45	176
WA125-EA13d/10	EA13d/10	3010	2.12 / 0.45	194
WA175-DA13d/10	DA13d/10	3510	3.03 / 0.45	273

Building Wall Design Table: **WA4**		Thickness: 200 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA200-AA13/10	AA13/10	2520	0.66 / 0.39	83
WA200-DA10/10	DA10/10	2590	0.79 / 0.39	93
WA200-EA13/10	EA13/10	2680	0.93 / 0.39	100
WA200-EA10d/10	EA10d/10	2790	1.10 / 0.39	113
WA200-B13	B13	2930	1.33 / 0.39	135
WA200-DA10d/10	DA10d/10	3090	1.57 / 0.39	154
WA200-EA13d/10	EA13d/10	3270	1.86 / 0.39	170
WA200-DA13d/10	DA3d/10	3770	2.65 / 0.39	239

Building Wall Design Table: **WA5**	Thickness: 225 mm Concrete Grade : 30 N/mm^2			
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA225-EA10/10	EA10/10	2710	0.49 0.35	64
WA225-AA13/10	AA13/10	2780	0.59 0.35	74
WA225-DA10/10	DA10/10	2860	0.70 0.35	82
WA225-EA13/10	EA13/10	2950	0.83 0.35	89
WA225-EA10d/10	EA10d/10	3050	0.98 0.35	101
WA225-B13	B13	3200	1.18 0.35	120
WA225-DA10d/10	DA10d/10	3350	1.40 0.35	137
WA225-EA13d/10	EA13d/10	3530	1.65 0.35	151
WA225-DA13d/10	DA13d/10	4030	2.36 0.35	212

Building Wall Design Table: **WA6**	Thickness: 250 mm Concrete Grade : 30 N/mm^2			
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA250-EA10/10	EA10/10	2970	0.44 0.31	58
WA250-AA13/10	AA13/10	3040	0.53 0.31	66
WA250-DA10/10	DA10/10	3120	0.63 0.31	74
WA250-EA13/10	EA13/10	3210	0.74 0.31	80
WA250-EA10d/10	EA10d/10	3320	0.88 0.31	90
WA250-B13	B13	3460	1.06 0.31	108
WA250-DA10d/10	DA10d/10	3610	1.26 0.31	123
WA250-EA13d/10	EA13d/10	3790	1.49 0.31	136
WA250-DA13d/10	DA13d/10	4290	2.12 0.31	191

Building Wall Design Table: **WA7**		Thickness: 275 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA275-EA10/10	EA10/10	3230	0.40 / 0.29	52
WA275-AA13/10	AA13/10	3300	0.48 / 0.29	60
WA275-DA10/10	DA10/10	3380	0.57 / 0.29	67
WA275-EA13/10	EA13/10	3470	0.68 / 0.29	73
WA275-EA10d/10	EA10d/10	3580	0.80 / 0.29	82
WA275-B13	B13	3720	0.97 / 0.29	98
WA275-DA10d/10	DA10d/10	3880	1.14 / 0.29	112
WA275-EA13d/10	EA13d/10	4060	1.35 / 0.29	123
WA275-DA13d/10	DA13d/10	4560	1.93 / 0.29	174

Building Wall Design Table: **WA8**		Thickness: 300 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WA300-AA13/10	AA13/10	3570	0.44 / 0.26	55
WA300-DA10/10	DA10/10	3640	0.52 / 0.26	62
WA300-EA13/10	EA13/10	3730	0.62 / 0.26	67
WA300-EA10d/10	EA10d/10	3840	0.73 / 0.26	75
WA300-B13	B13	3980	0.88 / 0.26	90
WA300-DA10d/10	DA10d/10	4140	1.05 / 0.26	103
WA300-EA13d/10	EA13d/10	4320	1.24 / 0.26	113
WA300-DA13d/10	DA13d/10	4820	1.77 / 0.26	159

Building Wall Design Table: WB1		Thickness: 125 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB125-A10	A10	1780	0.63 / 0.63	99
WB125-AA13/10	AA13/10	1950	1.06 / 0.63	133
WB125-DA10/10	DA10/10	2020	1.26 / 0.63	148
WB125-EA13/10	EA13/10	2110	1.49 / 0.63	160
WB125-EA10d/10	EA10d/10	2220	1.76 / 0.63	181
WB125-B13	B13	2360	2.12 / 0.63	216
WB125-DA10d/10	DA10d/10	2510	2.51 / 0.63	247
WB125-EA13d/10	EA13d/10	2690	2.97 / 0.63	271
WB125-DA13d/10	DA13d/10	3190	4.25 / 0.63	382

Building Wall Design Table: WB2		Thickness: 150 mm		
		Concrete Grade : 35 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB150-A10	A10	2080	0.52 / 0.52	82
WB150-AA13/10	AA13/10	2250	0.88 / 0.52	110
WB150-DA10/10	DA10/10	2330	1.05 / 0.52	123
WB150-EA13/10	EA13/10	2420	1.24 / 0.52	134
WB150-EA10d/10	EA10d/10	2530	1.47 / 0.52	151
WB150-B13	B13	2670	1.77 / 0.52	180
WB150-DA10d/10	DA10d/10	2820	2.09 / 0.52	206
WB150-EA13d/10	EA13d/10	3000	2.48 / 0.52	226
WB150-DA13d/10	DA13d/10	3500	3.54 / 0.52	318

Building Wall Design Table: WB3		Thickness:	175 mm	
		Concrete Grade :	35 N/mm^2	
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB175-A10	A10	2390	0.45	71
			0.45	
WB175-AA13/10	AA13/10	2560	0.76	95
			0.45	
WB175-DA10/10	DA10/10	2630	0.90	106
			0.45	
WB175-EA13/10	EA13/10	2720	1.06	114
			0.45	
WB175-EA10d/10	EA10d/10	2830	1.26	129
			0.45	
WB175-B13	B13	2970	1.52	154
			0.45	
WB175-DA10d/10	DA10d/10	3130	1.80	176
			0.45	
WB125-EA13d/10	EA13d/10	3310	2.12	194
			0.45	
WB175-DA13d/10	DA13d/10	3800	3.03	273
			0.45	

Building Wall Design Table: WA4		Thickness:	200 mm	
		Concrete Grade :	35 N/mm^2	
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB200-A13/10	AA13/10	2870	0.66	83
			0.39	
WB200-DA10/10	DA10/10	2940	0.79	93
			0.39	
WB200-EA13/10	EA13/10	3030	0.93	100
			0.39	
WB200-EA10d/10	EA10d/10	3140	1.10	113
			0.39	
WB200-B13	B13	3280	1.33	135
			0.39	
WB200-DA10d/10	DA10d/10	3430	1.57	154
			0.39	
WB200-EA13d/10	EA13d/10	3610	1.86	170
			0.39	
WB200-DA13d/10	DA3d/10	4110	2.65	239
			0.39	

Building Wall Design Table: **WB5**		Thickness: 225 mm		
		Concrete Grade : 35 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB225-EA10/10	EA10/10	3100	0.49 / 0.35	64
WB225-AA13/10	AA13/10	3170	0.59 / 0.35	74
WB225-DA10/10	DA10/10	3250	0.70 / 0.35	82
WB225-EA13/10	EA13/10	3340	0.83 / 0.35	89
WB225-EA10d/10	EA10d/10	3440	0.98 / 0.35	101
WB225-B13	B13	3590	1.18 / 0.35	120
WB225-DA10d/10	DA10d/10	3740	1.40 / 0.35	137
WB225-EA13d/10	EA13d/10	3920	1.65 / 0.35	151
WB225-DA13d/10	DA13d/10	4420	2.36 / 0.35	212

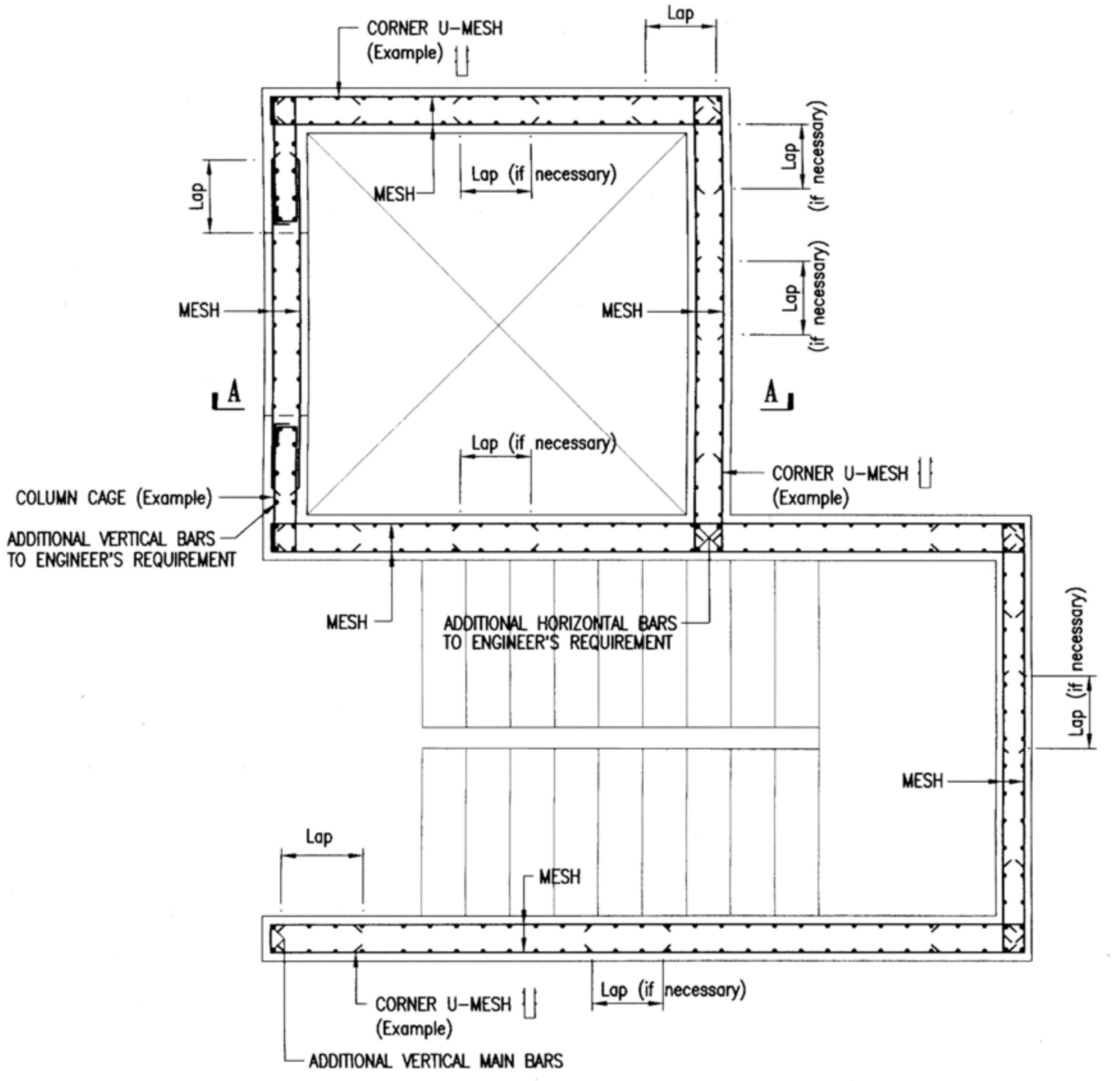
Building Wall Design Table: **WB6**		Thickness: 250 mm		
		Concrete Grade : 30 N/mm^2		
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf** / **% of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB250-EA10/10	EA10/10	3410	0.44 / 0.31	58
WB250-AA13/10	AA13/10	3480	0.53 / 0.31	66
WB250-DA10/10	DA10/10	3550	0.63 / 0.31	74
WB250-EA13/10	EA13/10	3640	0.74 / 0.31	80
WB250-EA10d/10	EA10d/10	3750	0.88 / 0.31	90
WB250-B13	B13	3890	1.06 / 0.31	108
WB250-DA10d/10	DA10d/10	4040	1.26 / 0.31	123
WB250-EA13d/10	EA13d/10	4220	1.49 / 0.31	136
WB250-DA13d/10	DA13d/10	4720	2.12 / 0.31	191

Building Wall Design Table: WB7		Thickness:	275 mm	
		Concrete Grade :	35 N/mm^2	
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB275-EA10/10	EA10/10	3710	0.40 / 0.29	52
WB275-AA13/10	AA13/10	3780	0.48 / 0.29	60
WB275-DA10/10	DA10/10	3860	0.57 / 0.29	67
WB275-EA13/10	EA13/10	3950	0.68 / 0.29	73
WB275-EA10d/10	EA10d/10	4060	0.80 / 0.29	82
WB275-B13	B13	4200	0.97 / 0.29	98
WB275-DA10d/10	DA10d/10	4350	1.14 / 0.29	112
WB275-EA13d/10	EA13d/10	4530	1.35 / 0.29	123
WB275-DA13d/10	DA13d/10	5030	1.93 / 0.29	174

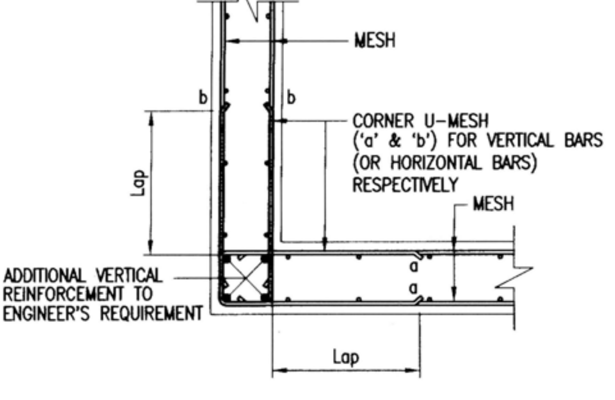
Building Wall Design Table: WB8		Thickness:	300 mm	
		Concrete Grade :	35 N/mm^2	
Wall Ref No.	**WWF Size**	**Ult Vert Load Capacity (KNm)**	**% of Vertical Reinf / % of Horizontal Reinf**	**Steel/Concrete (kg/m^3)**
WB300-AA13/10	AA13/10	4090	0.44 / 0.26	55
WB300-DA10/10	DA10/10	4170	0.52 / 0.26	62
WB300-EA13/10	EA13/10	4260	0.62 / 0.26	67
WB300-EA10d/10	EA10d/10	4360	0.73 / 0.26	75
WB300-B13	B13	4510	0.88 / 0.26	90
WB300-DA10d/10	DA10d/10	4660	1.05 / 0.26	103
WB300-EA13d/10	EA13d/10	4840	1.24 / 0.26	113
WB300-DA13d/10	DA13d/10	5340	1.77 / 0.26	159

4.3 Illustration On Use Of Mesh

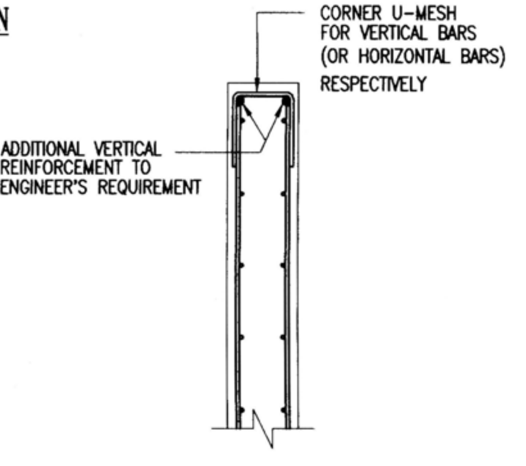
EXAMPLES FOR R.C. WALL



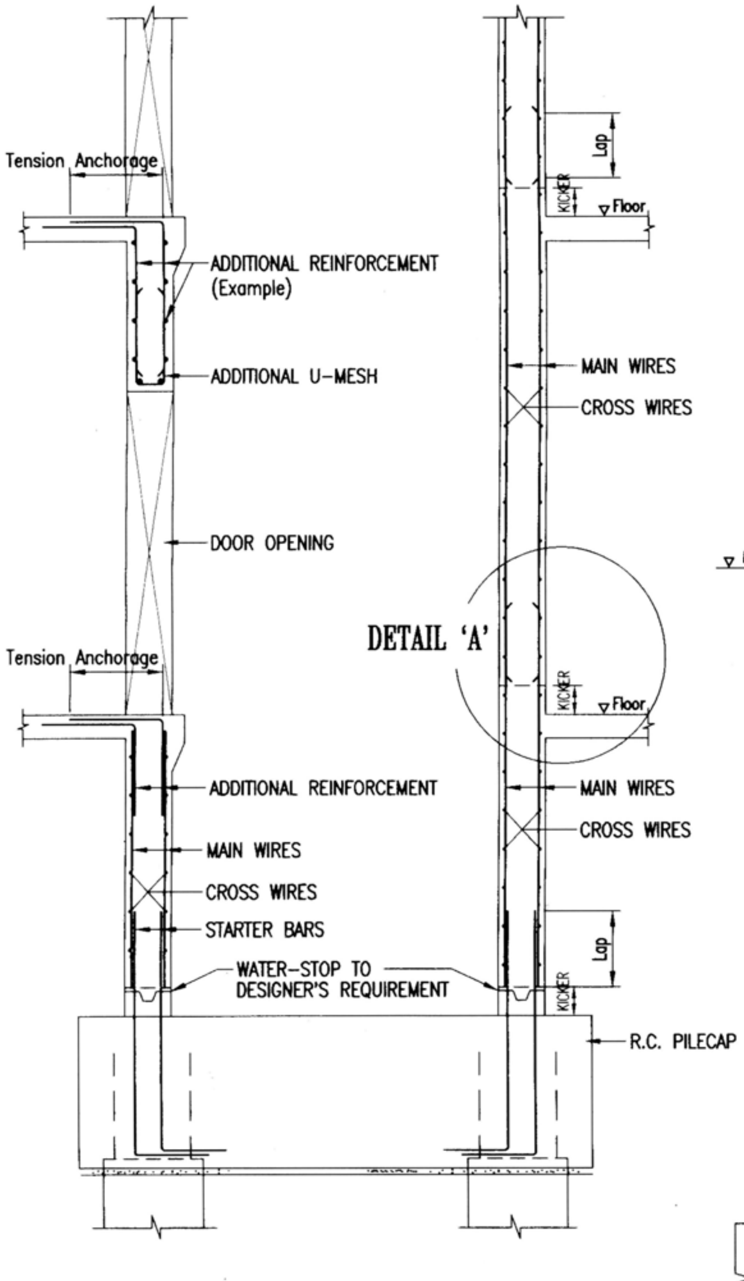
PLAN



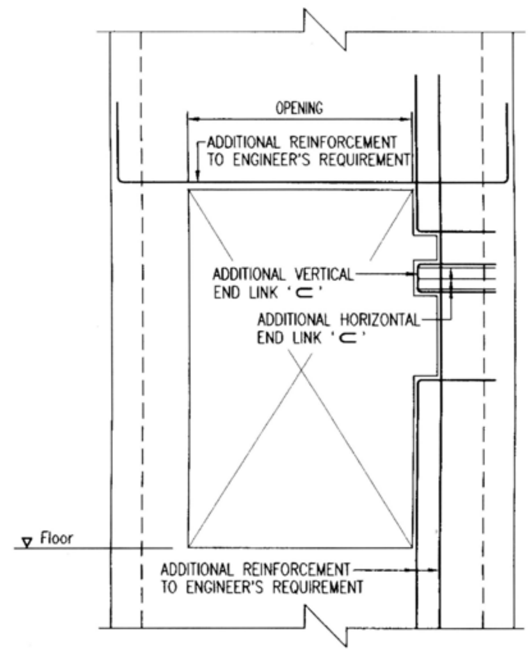
PLAN
Typical Wall Corner Reinforcement Detail
(On Horizontal & Vertical)



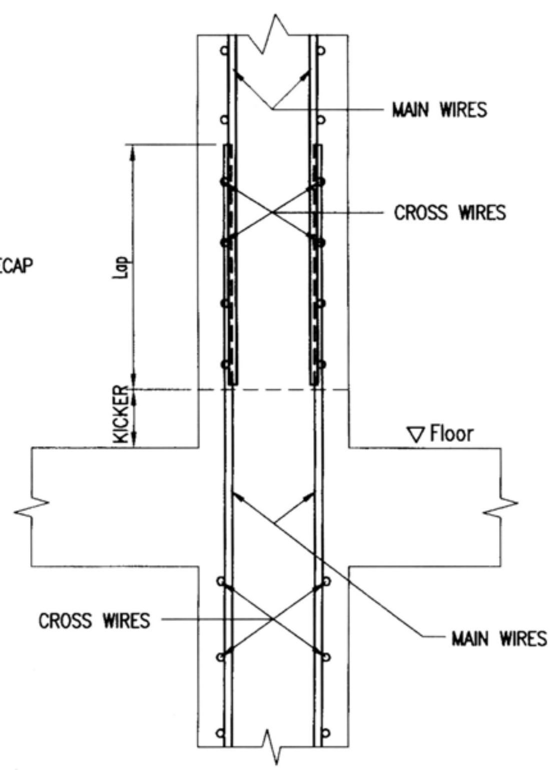
PLAN
Typical Wall End Reinforcement Detail
(On Horizontal & Vertical)



SECTION A - A



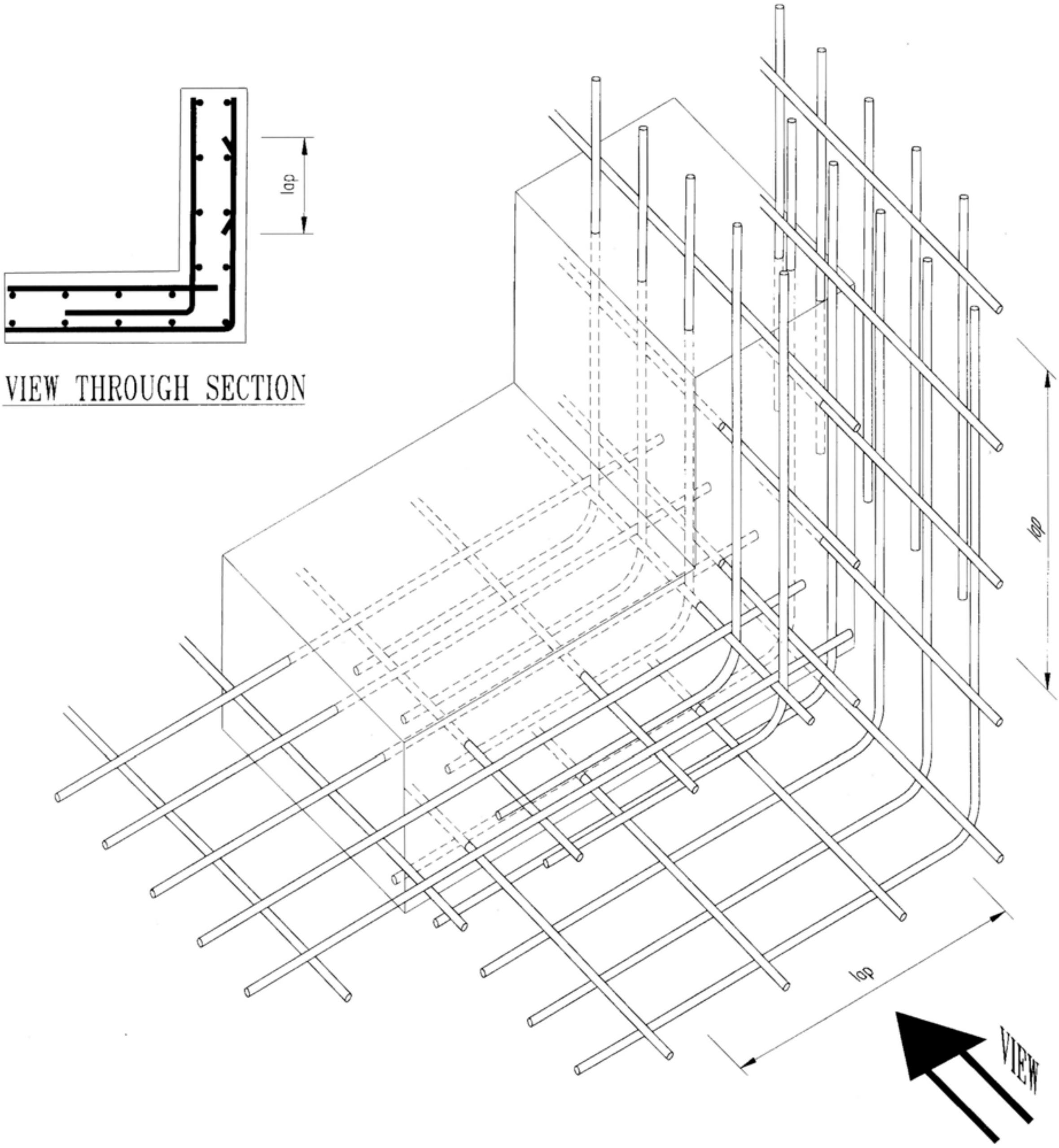
TYPICAL DETAIL OF WALL OPENING



DETAIL 'A'

SECTION FIVE

PILECAP REINFORCEMENT



VIEW THROUGH SECTION

BALCONY SPANDREL PANELS

SECTION FIVE : PILECAP REINFORCEMENT

This Section enables engineer to specify prefabricated reinforcement details for reinforced concrete pilecaps for single pile to 5-pilegroup. The pilecaps include those on precast concrete driven piles and bored piles.

Design pile capacity is based on pile material strength. Engineer shall use his own discretion when soil parameters governing the design of pile capacity. Engineer shall liaise with fabricators for feasible cage. When machine fabrication is not possible for reinforcement bar above 16mm diameter or due to their bars arrangement, manual fabrication could be adopted.

5.1 Design Considerations

1. Annotation for pilegroup reference number with its specific type, size and number of piles are shown in the following examples.

   Example (1): 1RP150 from Pilecap Design Table 'RP1', where,
   1RP – Denotes single pile for precast reinforced concrete driven pile
   150 – Denotes 150mm x 150mm precast reinforced concrete driven pile size

   Example (2): 5BP450 from Pilecap Design Table 'BP1', where,
   5BP – Denotes 5 Pilegroup for bored pile
   450 – Denotes 450mm diameter bored pile size

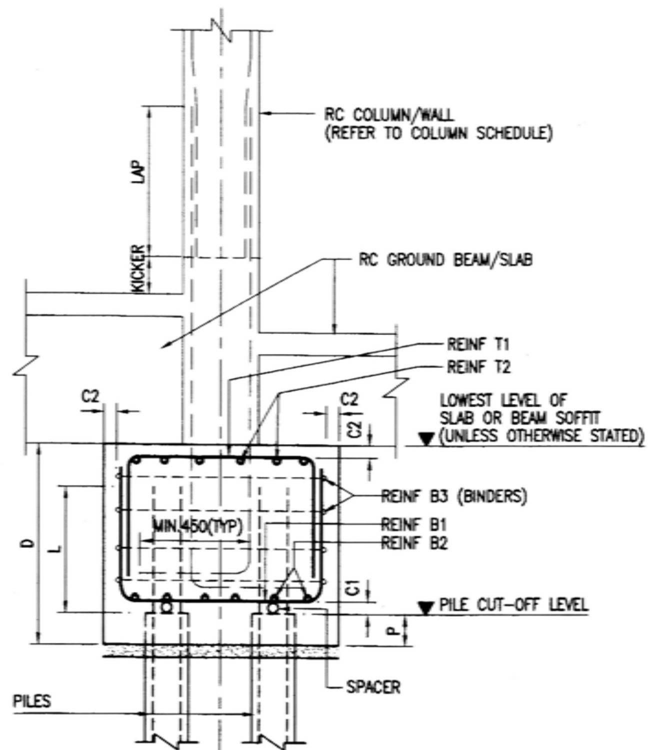
2. Pile working capacity based on material strength is used in the pilecap design.

   (i) For Grade 45 Precast Reinforced Concrete Driven Piles :-
   $$\text{Pile Working Capacity (in kN)} = \frac{(45)\text{N/mm}^2 \times (\text{Pile Area})\text{mm}^2 \times (10^{-3})\text{ kN}}{4}$$

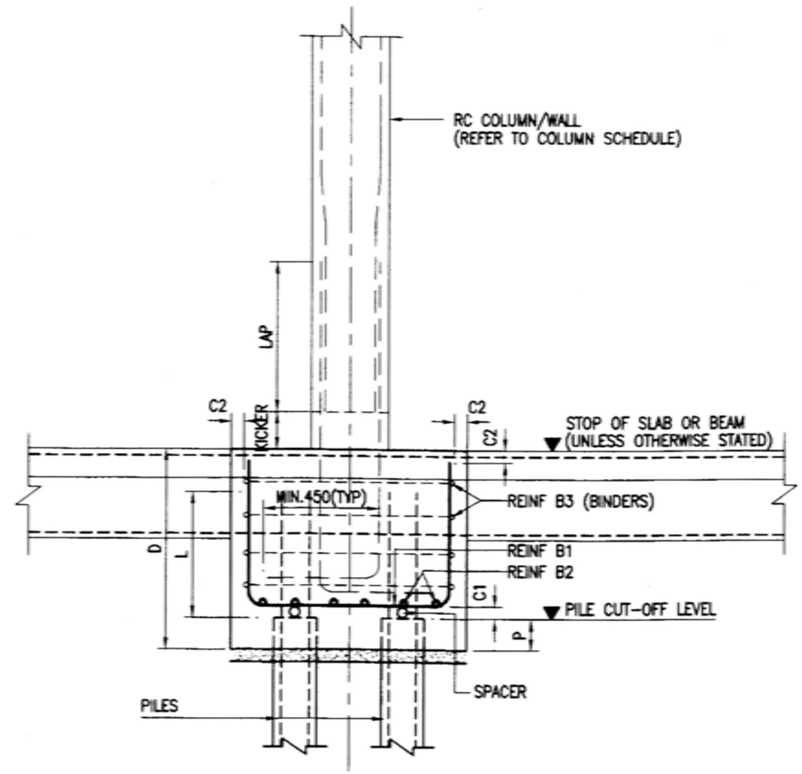
   (ii) For Grade 35 Bored Piles :-
   $$\text{Pile Working Capacity (in kN)} = \frac{(35)\text{N/mm}^2 \times (\text{Pile Area})\text{mm}^2 \times (10^{-3})\text{ kN}}{5}$$

3. Load factor 1.5 to pile working capacity is adopted in the pilecap design.
4. Piles spacings of 3.0 and 2.5 times are adopted for precast reinforced concrete driven pile and bored pile respectively subject to engineer's requirement.
5. Pile penetration of 100mm and 125mm are used in the pilecap design for precast reinforced concrete driven piles and bored piles respectively unless otherwise required by engineer.
6. Individual pile deviation from its true position is taken to be 75mm in the design.
7. Concrete covers to all sides and from pile cut-off level to nearer reinforcement are taken as 50mm unless otherwise specified by engineer.
8. Steel reinforcement of f_y, 460 N/mm^2 and concrete characteristic strength, f_{cu}, 35 N/mm^2 are adopted in the design. The use of other grade of concrete and/or larger concrete covers are subjected to engineer's requirement such as when severe exposure is to be met.
9. Provisional of 0.13% of concrete sectional area of pilecap for top layers of reinforcement and pile's reinforcement anchorage length are subjected to Engineer's requirement.
10. Horizontal binder reinforcement is taken as 25% of the main reinforcement areas of pilecap.
11. Engineer shall carry out his own check to ensure design shear stress along column perimeter is not exceeding $0.8\sqrt{f_{cu}}$ or 5 N/mm^2, whichever the lesser. Recommended minimum critical column perimeter shown in the design tables shall be taken as a guide.

5.2 Standard Notation For Pilecap For Precast Reinforced Concrete Driven Piles and Bored Piles



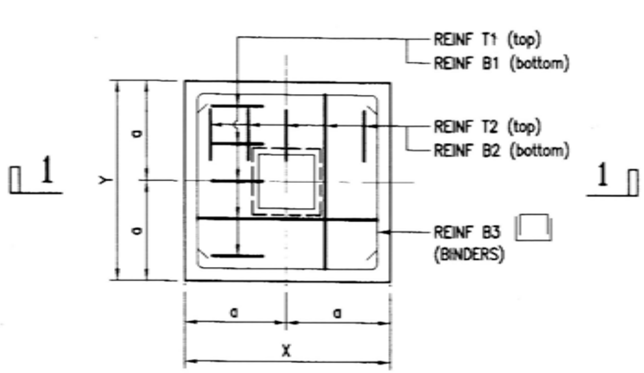
Example '1' : Typical Pilecap Sectional Detail with Slab or Beam on Top



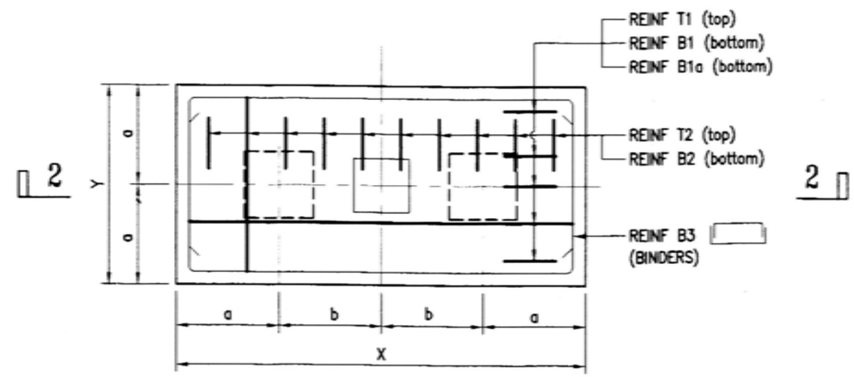
Example '2' : Typical Pilecap Sectional Detail with Slab or Beam Case Together

NOTES
(1) Provision of Top Layers of Reinforcements (T1 and T2) and Pile's Reinforcement Anchorage Length (L) are subjected to Engineer's requirement.
(2) Concrete Covers, C1 and C2 = 50 mm.
(3) Pile Penetration, P = 100 mm (for Precast Reinforced Concrete Driven Pile).
= 125 mm (for Bored Pile).

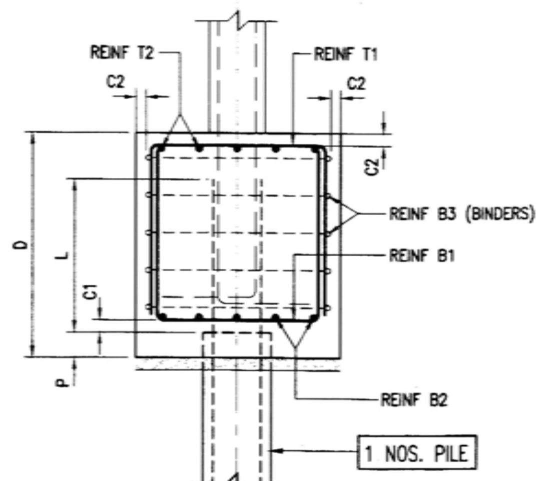
5.3 Satndard Notation For Pilecap For Single Pile And 2 Pilegroup



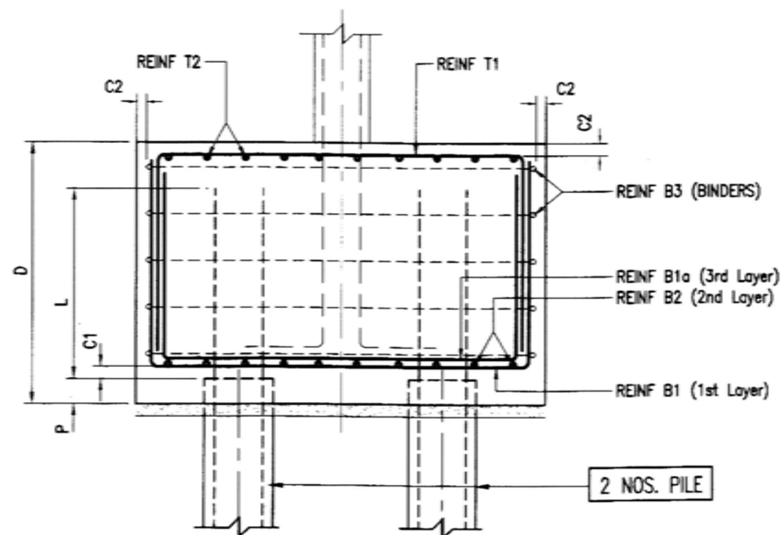
1 PILEGROUP PLAN



2 PILEGROUP PLAN



SECTION 1-1



SECTION 2-2

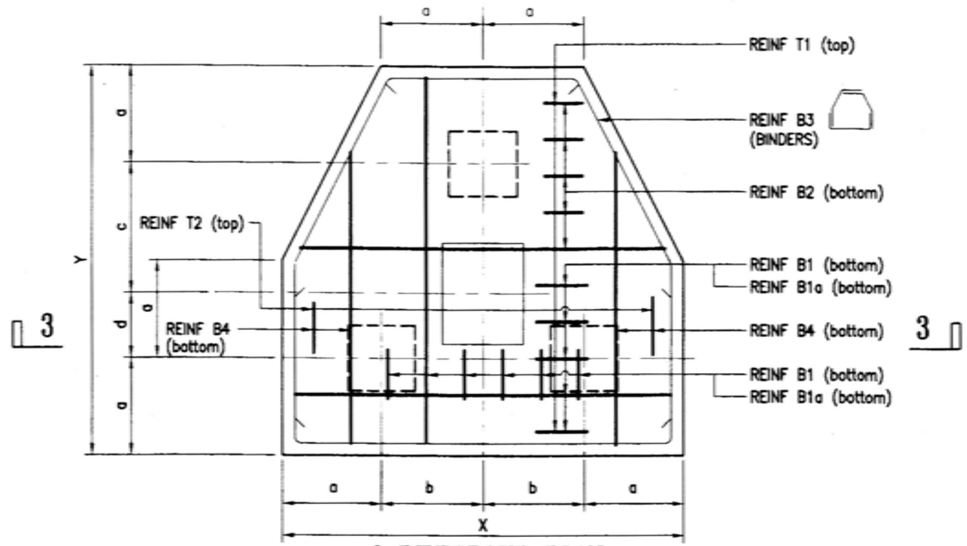
NOTES

(1) Provision of Top Layers of Reinforcements (T1 and T2) and Pile's Reinforcement Anchorage Length (L) are subjected to Engineer's requirement.

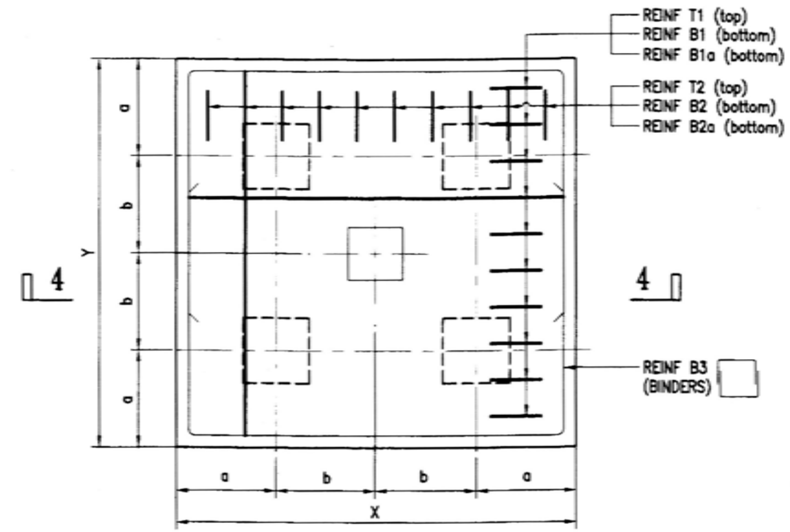
(2) Concrete Covers, C1 and C2 = 50 mm.

(3) Pile Penetration, P = 100 mm (for Precast Reinforced Concrete Driven Pile).
= 125 mm (for Bored Pile).

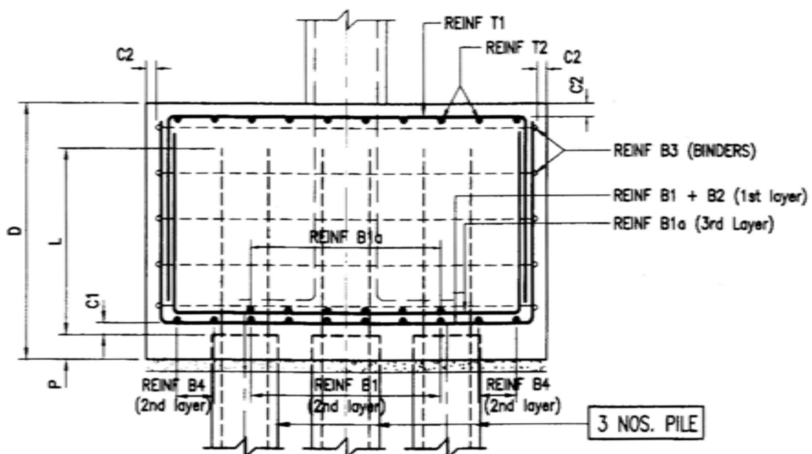
5.4 Standard Notation For Pilecap For 3 Pilegroup and 4 Pilegroup



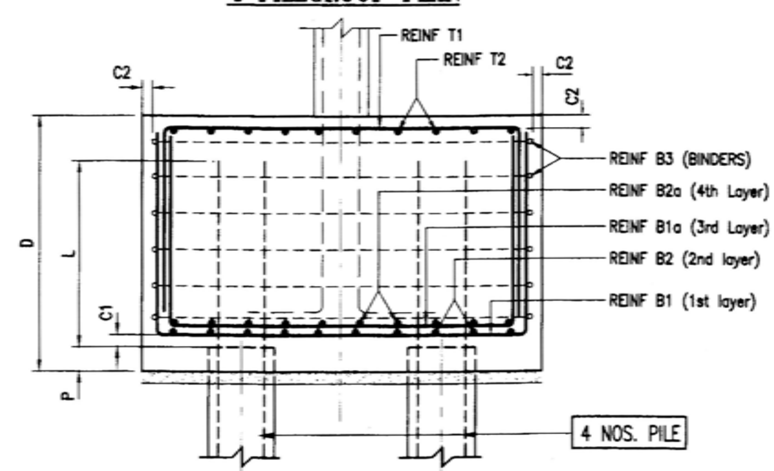
3 PILEGROUP PLAN



4 PILEGROUP PLAN



SECTION 3-3



SECTION 4-4

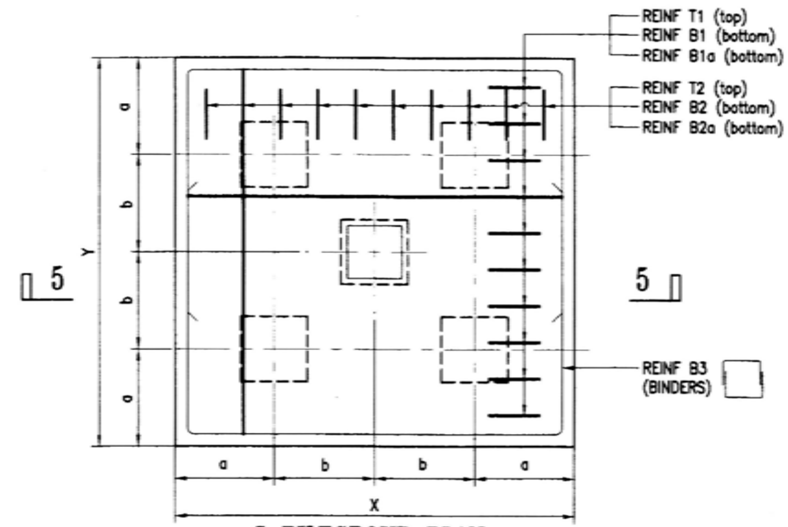
NOTES

(1) Provision of Top Layers of Reinforcements (T1 and T2) and Pile's Reinforcement Anchorage Length (L) are subjected to Engineer's requirement.

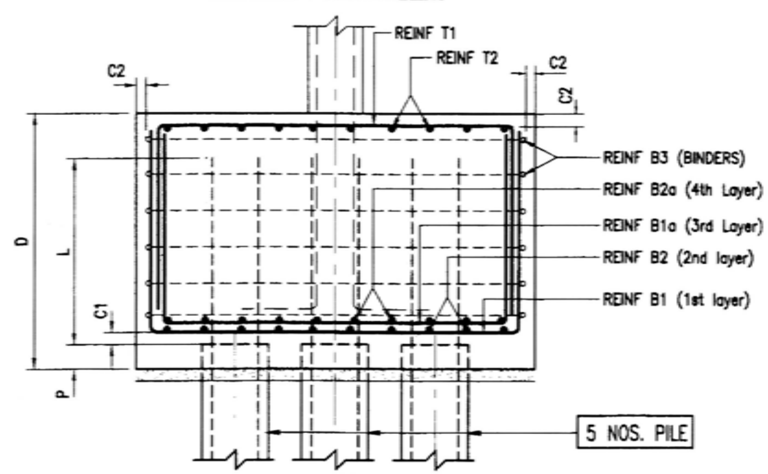
(2) Concrete Covers, C1 and C2 = 50 mm.

(3) Pile Penetration, P = 100 mm (for Precast Reinforced Concrete Driven Pile).
= 125 mm (for Bored Pile).

5.5 Standard Notation For Pilecap For 5 Pilegroup



5 PILEGROUP PLAN



SECTION 5-5

NOTES
(1) Provision of Top Layers of Reinforcements (T1 and T2) and Pile's Reinforcement Anchorage Length (L) are subjected to Engineer's requirement.
(2) Concrete Covers, C1 and C2 = 50 mm.
(3) Pile Penetration, P = 100 mm (for Precast Reinforced Concrete Driven Pile).
= 125 mm (for Bored Pile).

5.6 Pilecap Design Tables For Precast Reinforced Concrete Driven Piles

TABLE RP1: SCHEDULE OF PILECAP DETAILS FOR PRECAST REINFORCED CONCRETE DIRVEN PILES

Pilegroup Reference	Pilegroup Working Capacity (kN)	Pilecap Parameters (mm)							Reinforcement Details						Minmum Column Perimeter Req'd (mm)
		X	Y	D	a	b	c	d	Reinf B1	Reinf B2	Reinf B4	Reinf B3	Reinf T1	Reinf T2	
1RP 150	250	700	700	700	350				6T136	6T13		5T13	6T13	6T13	200
2RP 150	500	1200	700	700	350	250			6T13	10R13		5T13	6T13	10T13	350
3RP 150	750	1200	1150	800	350	250	300	150	7T16	4T13	2T13	5T13	11T13	11T13	450
4RP 150	1000	1200	1200	700	350	250			10T13	10T13		5T13	10T13	10T13	650
5RP 150	1250	1400	1400	700	350	350			13T13	13T13		5T13	13T13	13T13	800
1RP 175	340	700	700	700	350				6T13	6T13		5T13	6T13	6T13	250
2RP 175	680	1250	700	800	350	275			6T13	11T13		5T13	6T13	11T13	400
3RP 175	1020	1250	1150	800	350	275	300	150	6T16	4T13	2T13	5T13	10T13	10T13	600
4RP 175	1360	1250	1250	800	350	275			8T16	8T16		5T13	8T16	8T16	750
5RP 175	1700	1500	1500	800	350	400			12T16	12T16		5T13	12T13	12T13	950
1RP 200	450	700	700	700	350				6T13	6T13		5T13	6T13	6T13	300
2RP 200	900	1300	700	800	350	300			6T16	11T13		5T13	6T13	11T13	500
3RP 200	1350	1300	1230	800	350	300	350	180	8T16	4T13	2T13	5T13	12T13	12T13	750
4RP 200	1800	1300	1300	800	350	300			11T16	11T16		5T13	11T13	11T13	1000
5RP 200	2250	1600	1600	800	350	450			15T16	15T16		5T16	15T13	15T13	1250
1RP 250	700	700	700	700	350				6T13	6T13		5T13	6T13	6T13	450
2RP 250	1400	1450	700	1000	350	375			6T20	10T16		7T13	6T13	10T16	600
3RP 250	2100	1450	1360	1000	350	375	440	220	8T20	6T13	3T13	7T13	14T13	14T13	900
4RP 250	2800	1450	1450	1000	350	375			10T20	10T20		7T13	10T16	10T16	1200
5RP 250	3500	1800	1800	1000	350	550			14T20	14T20		7T16	14T16	14T16	1450
1RP 275	850	700	700	700	350				6T13	6T13		5T13	6T13	6T13	550
2RP 275	1700	1550	700	1100	350	425			5T25	12T16		7T13	5T16	12T16	650
3RP 275	2550	1550	1450	1100	350	425	500	250	6T25	6T16	3T16	7T13	12T16	12T15	950
4RP 275	3400	1550	1550	1100	350	425			12T20	12T20		7T13	12T16	12T16	1300
5RP 275	4250	1900	1900	1100	350	600			16T20	16T20		7T16	16T16	16T16	1600

TABLE RP2 : SCHEDULE OF PILECAP DETAILS FOR PRECAST REINFORCED CONCRETE DRIVEN PILES

Pilegroup Reference	Pilegroup Working Capacity (kN)	Pilecap Parameters (mm)							Reinforcement Details						Minmum Column Perimeter Req'd (mm)
		X	Y	D	a	b	c	d	Reinf B1	Reinf B2	Reinf B4	Reinf B3	Reinf T1	Reinf T2	
1RP 300	1010	800	800	700	400				7T13	7T13		5T13	7T13	7T13	650
2RP 300	2020	1700	800	1100	400	450			6T25	13T16		7T13	6T16	13T16	750
3RP 300	3030	1700	1580	1100	400	450	520	260	7T25	6T16	3T16	7T13	13T16	13T16	1150
4RP 300	4040	1700	1700	1100	400	450			13T25	13T25		7T16T	13T16	13T16	1500
5RP 300	5050	2100	2100	1100	400	650			15T25	15T25		8T16	15T16	15T16	1900
1RP 350	1380	800	800	700	400				7T13	7T13		5T13	7T13	7T13	900
2RP 350	2760	1850	800	1200	400	525			7T25	15T16		8T13	7T16	15T16	950
3RP 350	4140	1850	1730	1200	400	525	620	310	9T25	6T16	3T16	8T13	15T16	15T16	1400
4RP 350	5520	1850	1850	1100	400	525			15T25	15T25		5T13	15T16	15T16	2050
5RP 350	6900	2300	2300	1100	400	750			20T25	20T25		8T20	20T16	20T16	2600
1RP 375	1580	800	800	800	400				7T13	7T13		5T13	7T13	7T13	850
2RP 375	3160	1950	800	1250	400	575			7T28	16T16		8T13	7T16	16T16	1050
3RP 375	4740	1950	1820	1250	400	575	720	360	8T28	6T20	3T20	8T16	14T20	14T20	1550
4RP 375	6320	1950	1950	1200	400	575			17T25	17T25		8T16	17T16	17T16	2150
5RP 375	7900	2400	2400	1200	400	800			22T25	22T25		9T20	22T16	22T16	2650
1RP 400	1800	850	850	800	425				6T16	6T16		5T13	6T16	6T16	1000
2RP 400	3600	2050	850	1250	425	600			8T28	18T16		9T13	8T16	18T16	1150
3RP 400	5400	2050	1900	1400	425	600	700	350	7T32	6T20	3T20	9T16	13T20	13T20	1550
4RP 400	7200	2050	2050	1250	425	600			17T28	17T28		8T20	17T16	17T16	2300
5RP 400	9000	2550	2550	1250	425	850			21T28	21T28		10T20	21T16	21T16	2900
1RP 450	2280	900	900	800	450				7T16	7T16		5T13	7T16	7T16	1250
2RP 450	4560	2250	900	1400	450	675			8T32	21T16		9T16	8T16	21T16	1300
3RP 450	6840	2250	2070	1400	450	675	780	390	9T32	6T20	3T20	9T16	15T20	15T20	1950
4RP 450	9120	2250	2250	1250	450	675			21T28	21T28		10T20	21T16	21T16	2950
5RP 450	11400	2850	2850	1250	450	975			28T28	28T28T		9T25	28T16	28T16	3650

5.7 Pilecap Design Tables For Bored Piles

TABLE BP1: SCHEDULE OF PILECAP DETAILS FOR BORED PILES

Pilegroup Reference	Pilegroup Working Capacity (kN)	Pilecap Parameters (mm)							Reinforcement Details								Minmum Column Perimeter Req'd (mm)
		X	Y	D	a	b	c	d	Reinf B1	Reinf B1a	Reinf B2	Reinf B2a	Reinf B4	Reinf B3	Reinf T1	Reinf T2	
1BP 450	1110	100	100	700	500				8T13		8T13			3T13	8T13	8T13	750
2BP 450	2220	2200	1000	1150	500	600			8T25		16T16			6T13	8T16	16T16	800
3BP 450	3330	2200	2050	1150	500	600	700	350	9T25		8T16		4T16	6T16	17T16	17T16	1200
4BP 450	4440	2200	2200	1150	500	600			20T20		20T20			8T16	20T16	20T16	1600
5BP 450	5550	2600	2600	1150	500	800			19T25		19T25			10T16	20T16	20T16	2000
1BP 500	1370	1000	1000	700	500				8T13		8T13			3T13	8T13	8T13	950
2BP 500	2740	2300	1000	1150	500	650			9T25		18T16			5T16	9T16	18T16	1000
3BP 500	4110	2300	2140	1150	500	650	760	380	11T25		8T20		4T20	7T16	19T16	19T16	1500
4BP 500	5480	2300	2300	1150	500	650			18T25		18T25			10T16	18T16	18T16	2000
5BP 500	6850	2800	2800	1150	500	900			23T25		23T25			9T20	23T16	23T16	2500
1BP 600	1980	1100	1100	800	550				10T13		10T13			4T13	10T13	10T13	1150
2BP 600	3960	2600	1100	1400	550	750			7T32		24T16			10T13	7T20	24T16	1150
3BP 600	5940	2600	2420	1400	550	750	880	440	9T32		10T20		5T20	9T16	19T20	19T20	1750
4BP 600	7920	2600	2600	1400	550	750			16T32		16T32			9T20	16T20	16T20	2300
5BP 600	9900	3300	3300	1400	550	1100			20T32		20T32			9T25	20T20	20T20	2850
1BP 700	2690	1200	1200	800	600				11T13		11T13			5T13	11T13	11T13	1550
2BP 700	5380	3000	1200	1400	600	900			11T32		18T20			11T16	11T20	18T20	1550
3BP 700	8070	3000	2760	1500	600	900	1040	520	13T32		12T20		6T20	9T20	25T20	25T20	2150
4BP 700	10760	3000	3000	1400	600	900			22T32		22T32			9T25	22T20	22T20	3100
5BP 700	13450	3700	3700	1400	600	1250			29T32		29T32			12T25	29T20	29T20	3900
1BP 800	3520	1300	1300	800	650				11T16		11T16			4T23	11T13	11T13	2000
2BP 800	7040	3300	1300	1500	650	1000			8T32	8T32	21T20			9T20	8T25	21T20	1900
3BP 800	10560	3300	3040	1500	650	1000	1160	580	10T32	10T32	14T20	10T32	7T20	12T20	21T20	21T20	2800
4BP 800	14080	3300	3300	1500	650	1000			14T32	14T32	14T32	14T32			14T25	14T25	3750
5BP 800	17600	4200	4200	1500	650	1450			20T32	20T32	20T32	20T32		10T32	20T25	20T25	4700

TABLE BP2: SCHEDULE OF PILECAP DETAILS FOR BORED PILES

Pilegroup Reference	Pilegroup Working Capacity (kN)	Pilecap Parameters (mm)							Reinforcement Details								Minmum Column Perimeter Req'd (mm)
		X	Y	D	a	b	c	d	Reinf B1	Reinf B1a	Reinf B2	Reinf B2a	Reinf B4	Reinf B3	Reinf T1	Reinf T2	
1BP 900	4450	1400	1400	800	700				12T16		12T16			5T13	12T16	12T16	2550
2BP 900	8900	3700	1400	1500	700	1150			10T32	10T32	24T20			13T20	10T20	24T20	2400
3BP 900	13350	3700	3410	1600	700	1150	1340	670	13T32	13T32	16T20	13T32	8T20	10T25	29T20	29T20	3300
4BP 900	17800	3700	3700	1600	700	1150			19T32	19T32	19T32	19T32		10T32	19T25	19T25	4400
5BP 900	22250	4600	4600	1600	700	1600			25T32	25T32	25T32	25T32		13T32	25T25	25T25	5500
1BP 1000	5500	1500	1500	800	750				10T20		10T20			6T13	10T20	10T20	3150
2BP 1000	11000	4000	1500	1500	750	1250			15T32	15T32	25T20			11T25	15T16	25T20	2950
3BP 1000	16500	4000	3690	1650	750	1250	1460	730	16T32	16T32	18T20	16T32	9T20	14T25	34T20	34T20	3950
4BP 1000	22000	4000	4000	1600	750	1250			24T32	24T32	24T32	24T32		12T32	24T25	24T25	5250
5BP 1000	27500	5100	5100	1600	750	1800			35T32	35T32	35T32	35T32		17T32	35T20	35T20	6550
1BP 1100	6650	1600	1600	900	800				10T20		10T20			6T13	10T20	10T20	3250
2BP 1100	13300	4400	1600	1800	800	1400			15T32	15T32	22T25			12T25	15T20	22T25	2900
3BP 1100	19950	4400	4030	2100	800	1400	1620	810	17T32	17T32	16T25	17T32	8T25	14T25	33T25	33T25	3650
4BP 1100	26600	4400	4400	2100	800	1400			25T32	25T32	25T32	25T32		13T32	25T25	25T25	4850
5BP 1100	33250	5500	5500	2100	800	1950			34T32	34T32	34T32	34T32		17T32	34T25	34T25	6050
1BP 1200	7920	1700	1700	1000	850				10T20		10T20			6T13	10T20	10T20	3400
2BP 1200	15840	4700	1700	2100	850	1500			16T32	16T32	27T25			13T25	16T20	27T25	2900
3BP 1200	23760	4700	4310	2100	850	1500	1740	870	21T32	21T32	18T25	21T32	9T25	13T32	39T25	39T25	4300
4BP 1200	31680	4700	4700	2400	850	1500			27T32	27T32	27T32	27T32		15T32	30T25	30T25	4950
5BP 1200	39600	6000	6000	2400	850	2150			39T32	39T32	39T32	39T32		19T32	39T25	39T25	6200

SECTION SIX

OTHER APPLICATIONS OF PREFABRICATED REINFORCEMENT

SECTION SIX : OTHER APPLICATIONS OF PREFABRICATED REINFORCEMENT

This Sections provides general detailing for various structural reinforced concrete elements which prefabricated reinforcement bars by manual fabrication and/or welded wire fabric could be adopted.

6.1 General Notes On Applications

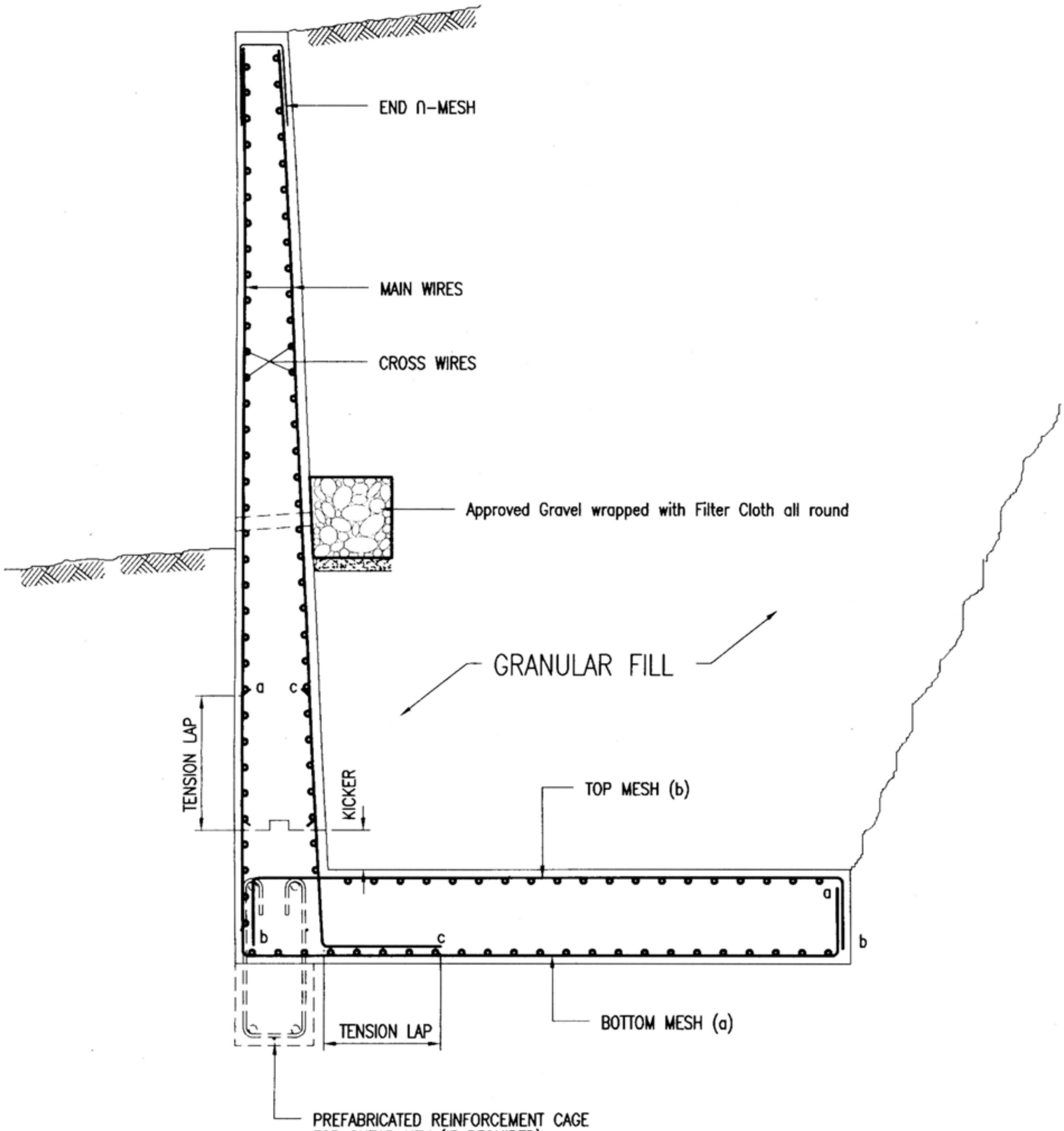
1. Standard series of welded wire fabric are widely specified by engineers for use in non-suspended ground slabs, suspended floor slabs, building walls, external retaining walls, strip and pad footings, box-culverts, open and closed drains and any other reinforced concrete structural elements and architectural features such as fin and parapet walls. Such structural components could be in the forms of precast, prestressed or cast-in-situ elements.

2. Where standard mesh does not meet a particular design requirement, custom-made welded wire fabric termed as "Designer" or "Engineered" series can be manufactured by specialist suppliers upon engineer's request and early consultation.

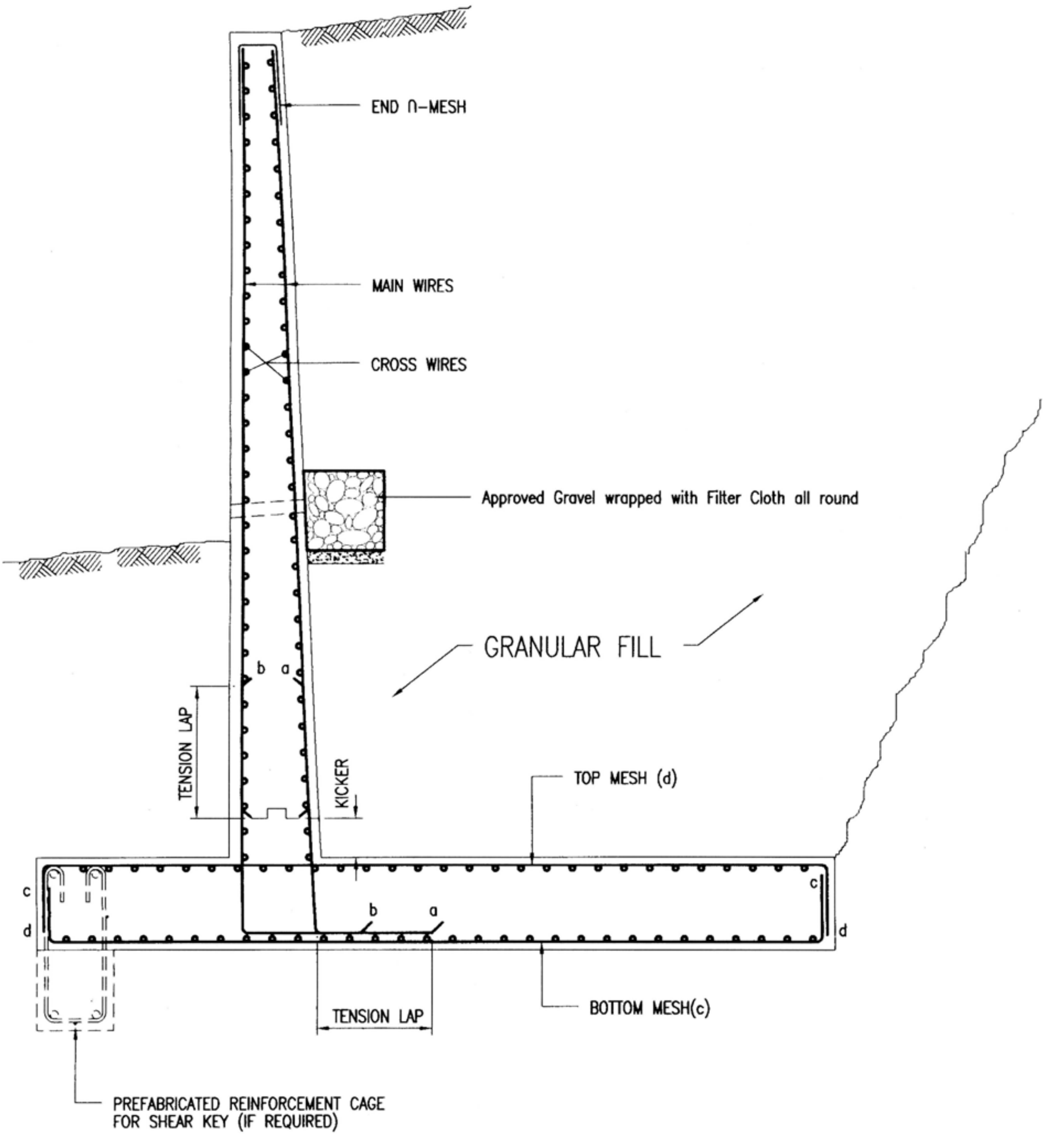
3. Similarly, to reduce site wastage, overcome tight working space and increase productivity and speed on construction as well as when fabric could not meet the design requirement for higher reinforcement content, prefabricated reinforcement bars cage to be factory-made prior sending to project sites for such structural elements could be made.

4. Engineer shall liaise with specialist suppliers and fabricators on the feasible cage to meet lifting, lapping and installation requirements.

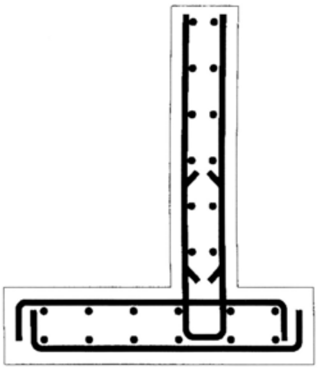
5. Engineer may consider to use structural couplers, if need arises, to meet lapping, lifting and installation requirements on site.



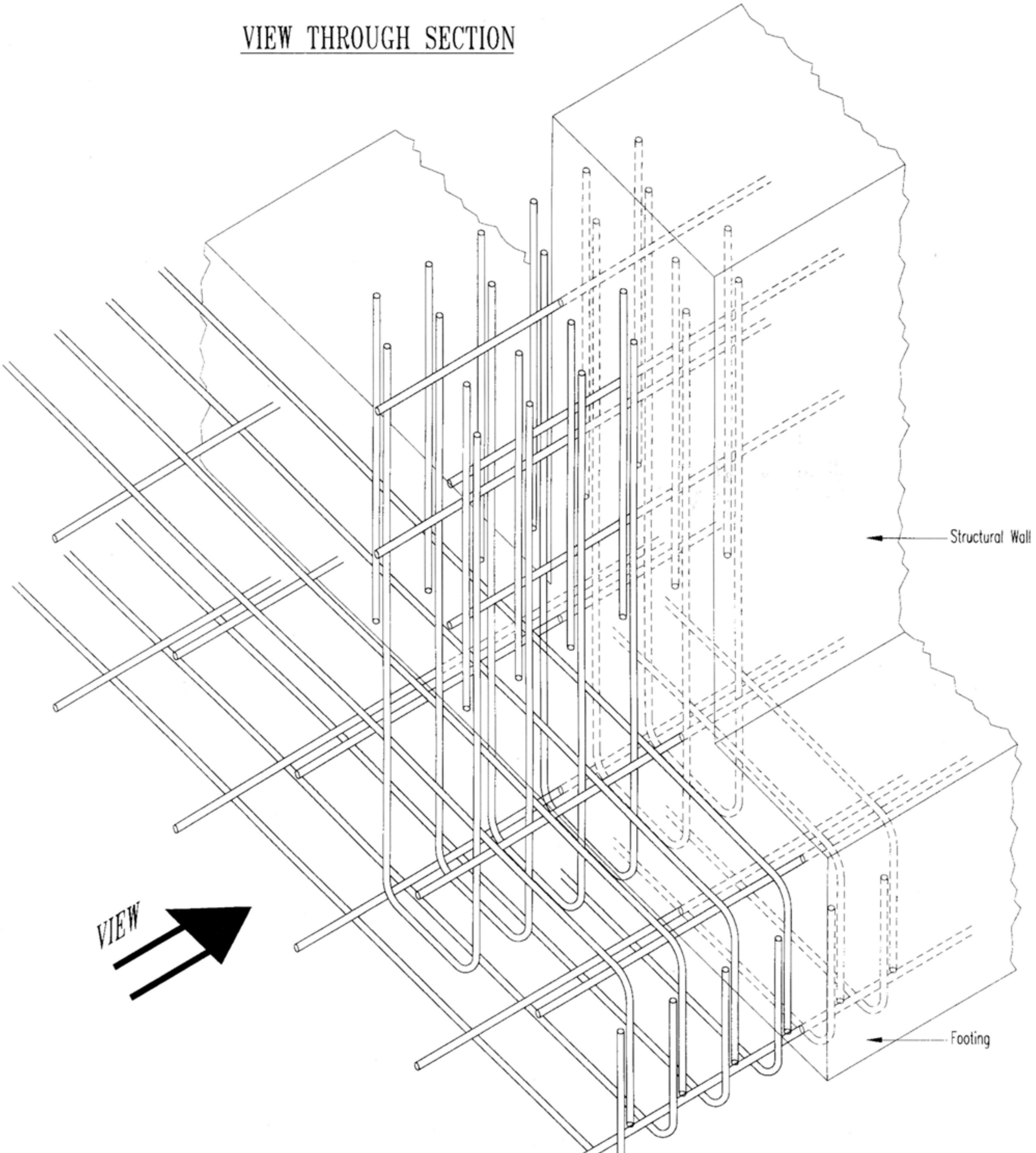
EXAMPLE (1) : TYPICAL SECTION OF RETAINING WALL



EXAMPLE (2) : TYPICAL SECTION OF RETAINING WALL

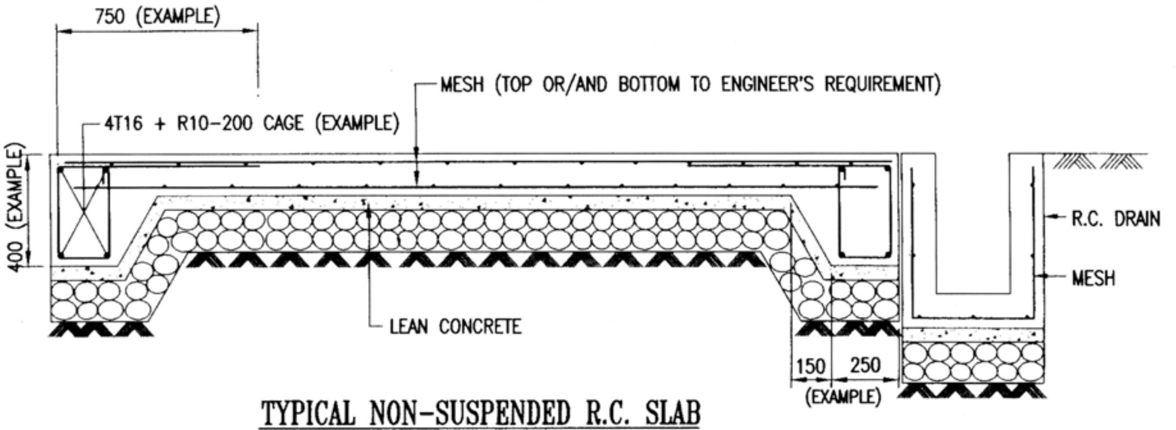


VIEW THROUGH SECTION

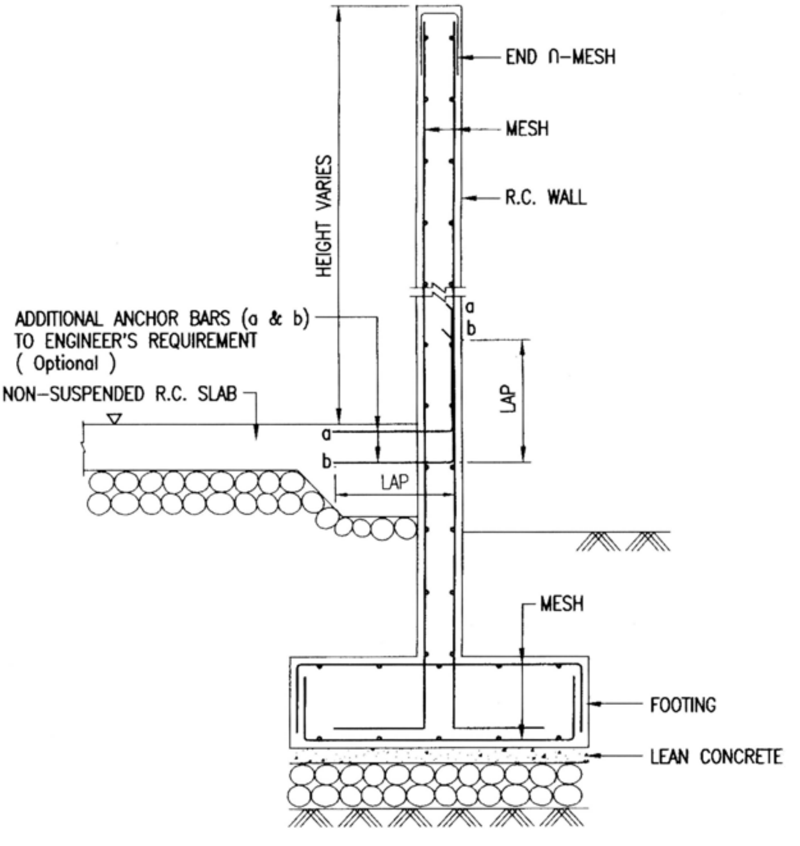


STRUCTURAL WALL AND FOOTING

6.3 Non-Suspended Slab And Footing

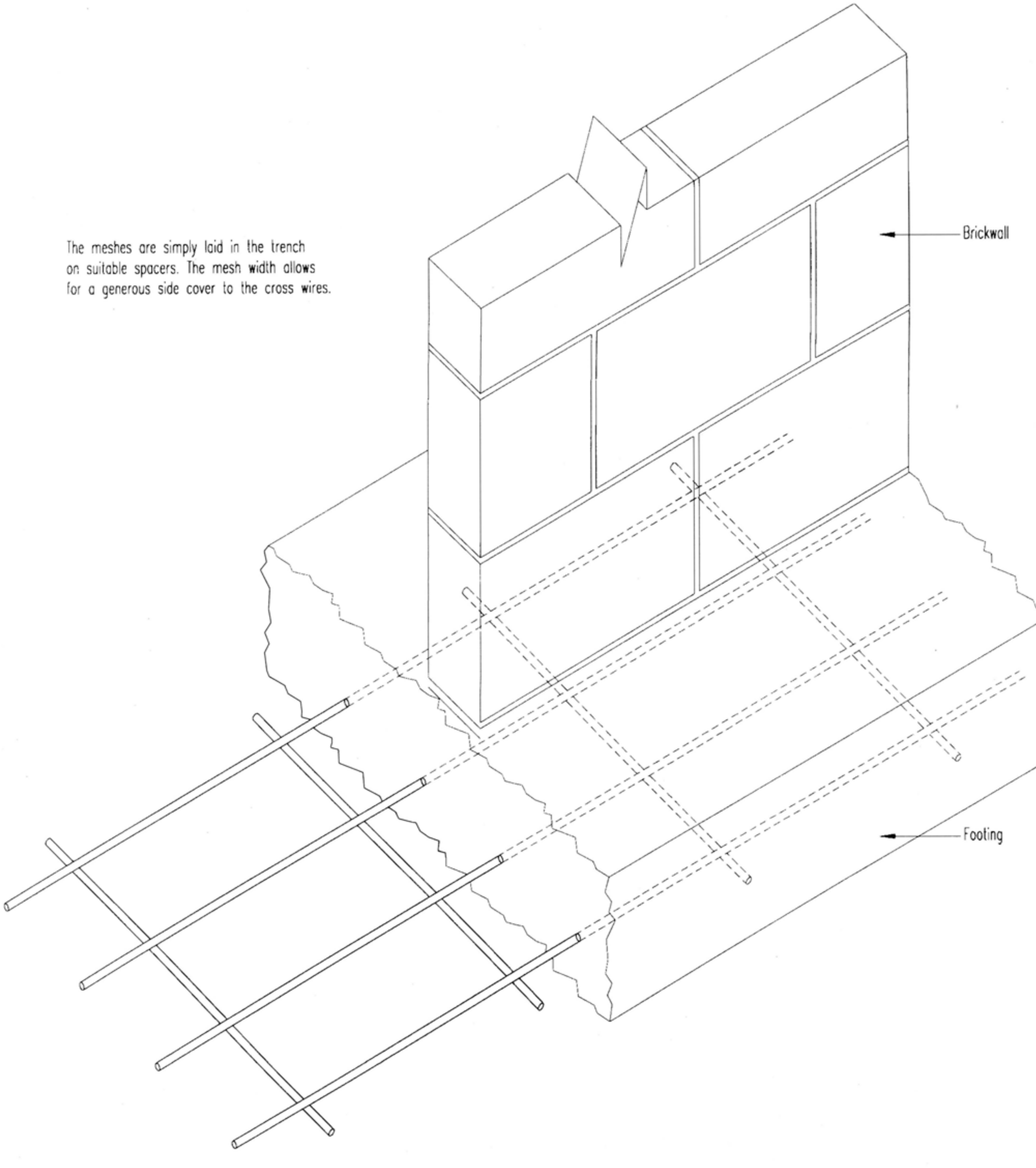


TYPICAL NON-SUSPENDED R.C. SLAB



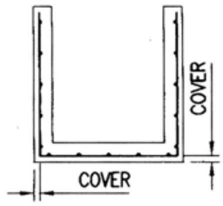
TYPICAL DETAIL FOR STRIP FOOTING &
EXTERNAL R.C. FASCIA WALL

The meshes are simply laid in the trench on suitable spacers. The mesh width allows for a generous side cover to the cross wires.

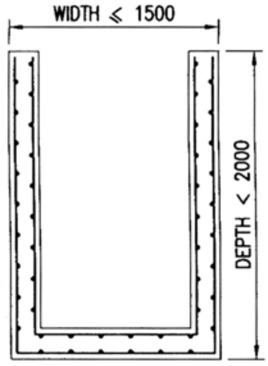


BRICKWALL AND FOOTING

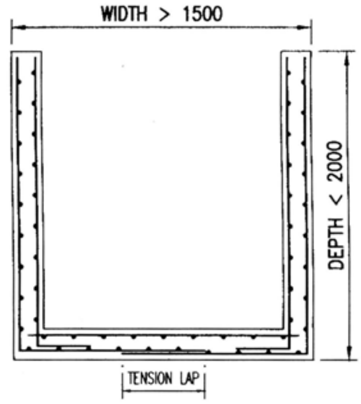
6.4 Drain And Box Culvert



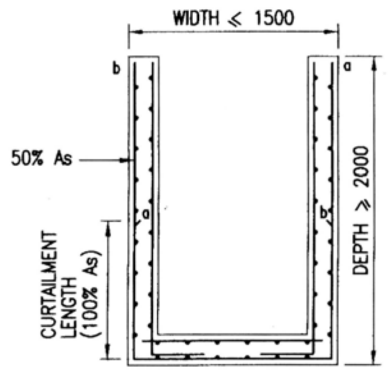
Type '1'
1 U-BEND MESH



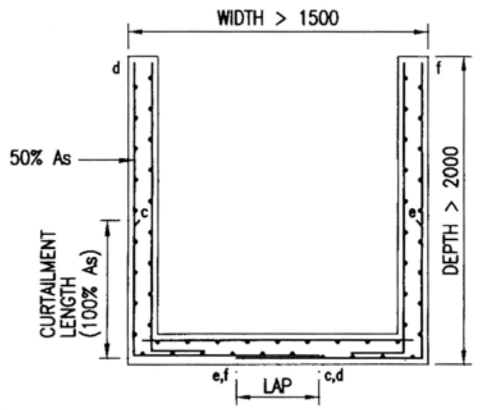
Type '2'
2 U-BEND MESH



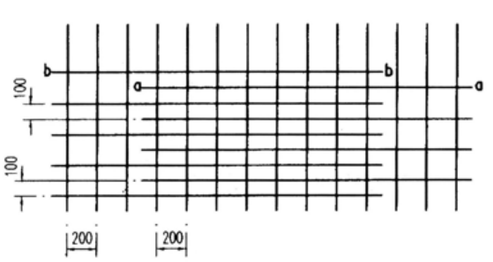
Type '3'
4 L-BEND MESH & 1 FLAT SHEET



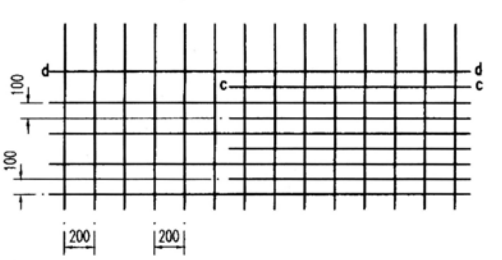
Type '4'
1 U-BEND STAGGERED MESH (a & b)
& 2 L-BEND MESH



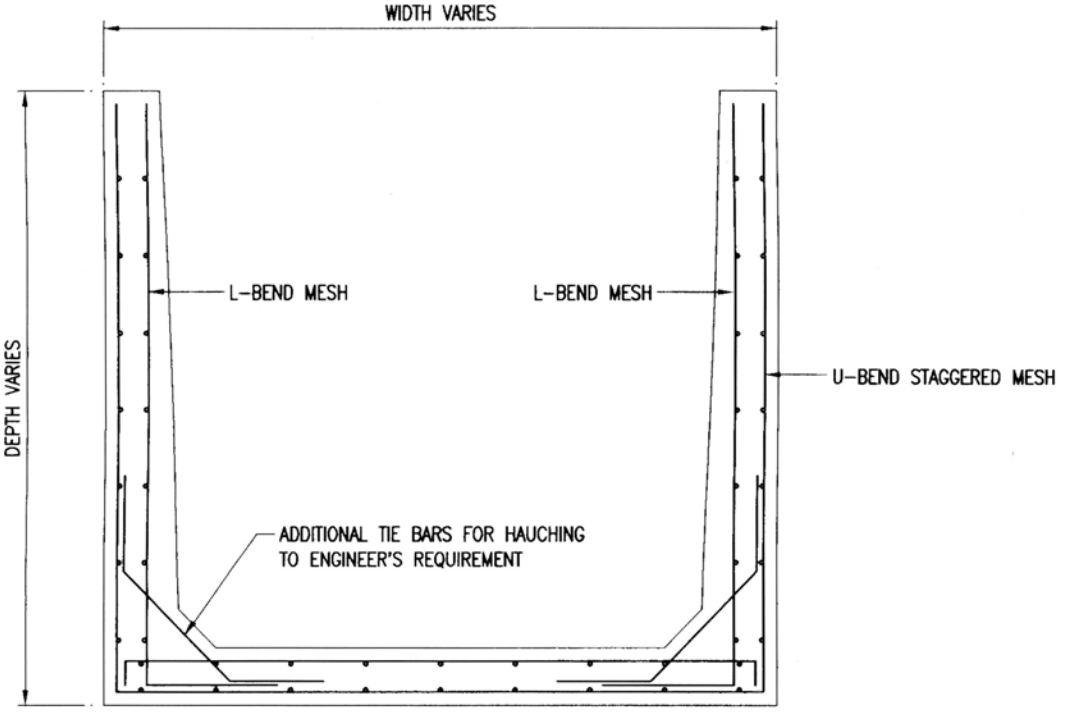
Type '5'
2 L-BEND STAGGERED MESH (c,d & e,f)
& 2 L-BEND MESH & 1 FLAT SHEET



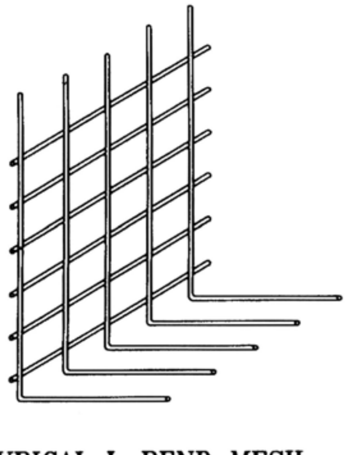
DETAIL 'A'
Profile of U-BEND STAGGERED MESH
before bending for TYPE '4'



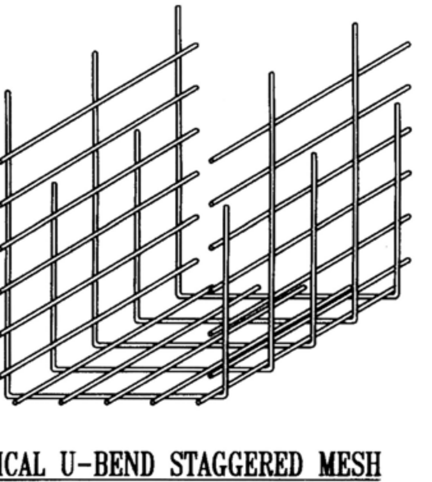
DETAIL 'B'
Profile of L-BEND STAGGERED MESH
before bending for TYPE '5'



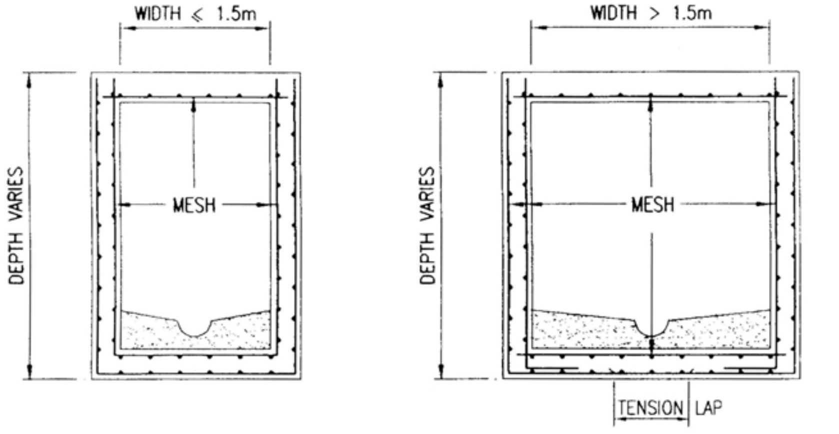
TYPICAL SECTION OF R.C. DRAIN



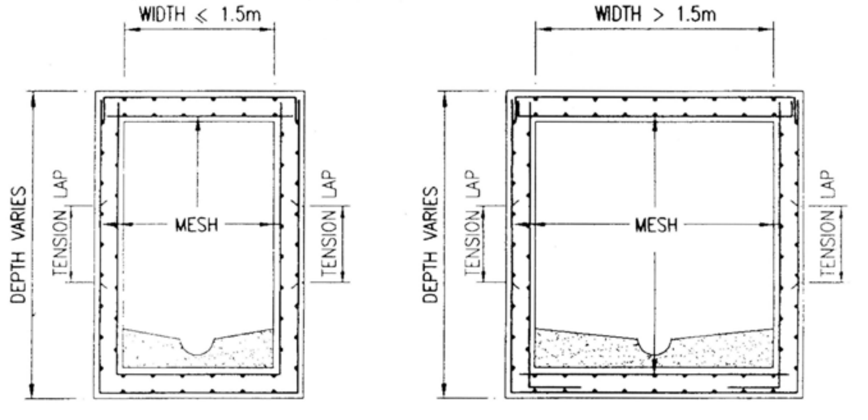
TYPICAL L-BEND MESH



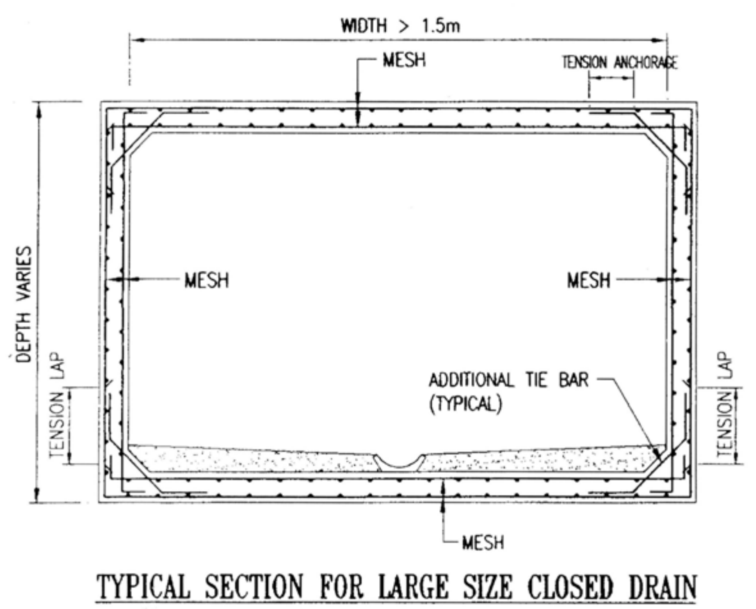
TYPICAL U-BEND STAGGERED MESH



TYPICAL SECTION OF CLOSED DRAIN



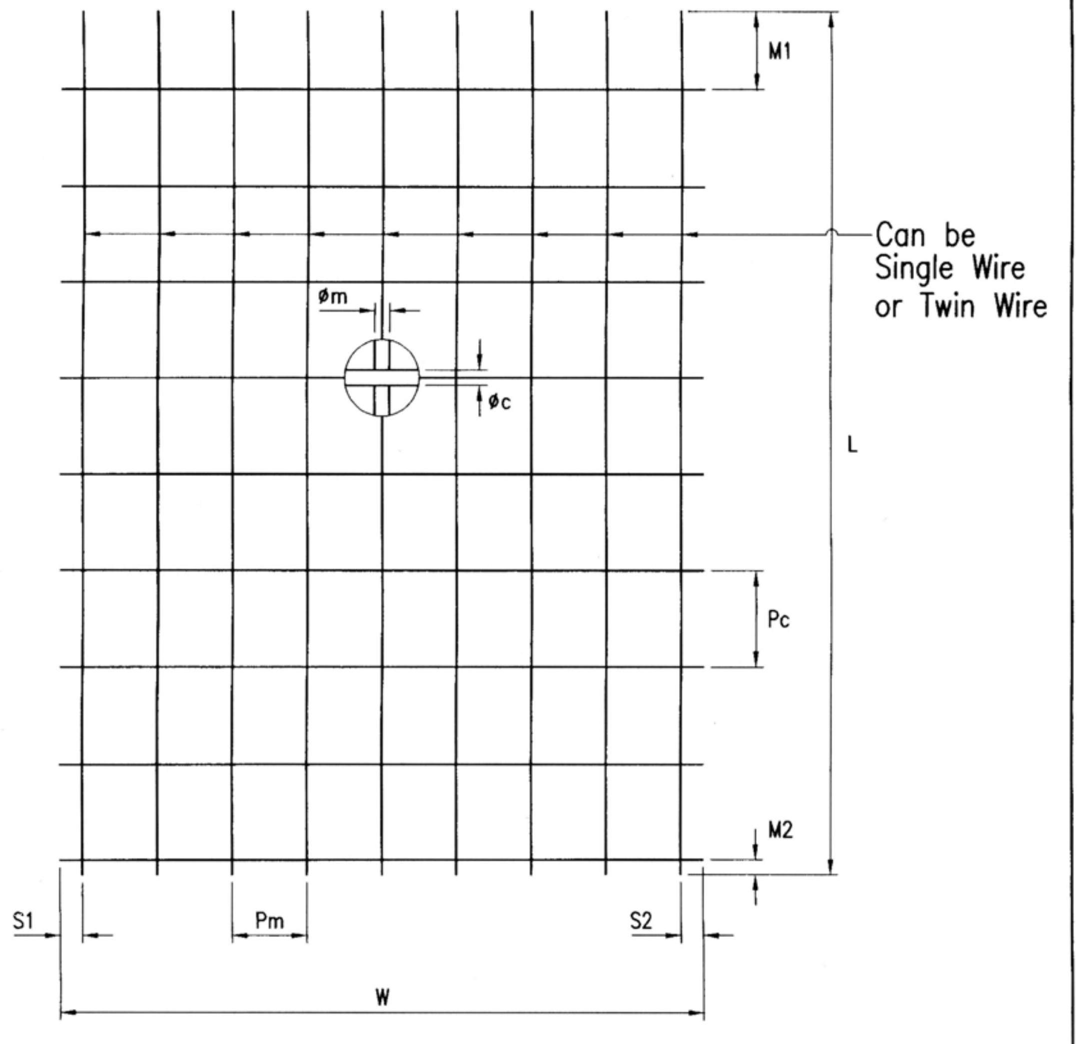
TYPICAL SECTION OF BOX CULVERT



TYPICAL SECTION FOR LARGE SIZE CLOSED DRAIN

Appendix

Welded Wire Fabric Dimensions



Legend

L	- length of sheet	Pm	- pitch of main wire
W	- width of sheet	Pc	- pitch of cross wire
Øm	- main wire diameter	M1, M2	- main wire overhang
Øc	- cross wire diameter	S1, S2	- cross wire overhang

TABLE FOR WELDED WIRE FABRIC

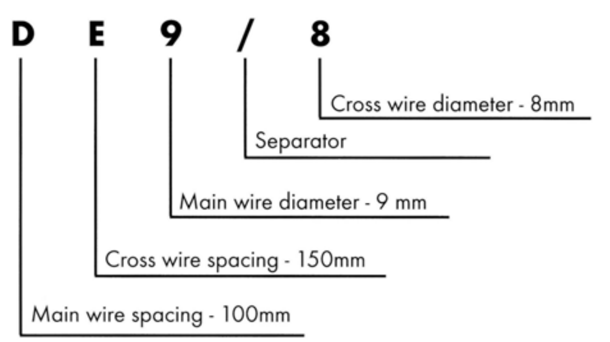
WWF Ref. No.	Cross- Sectional Area (mm²/m)		Wire Spacing (mm)		Wire Diameter (mm)		Nominal Mass (kg/m²)
	Main	Cross	Main	Cross	Main	Cross	
SQUARE FABRIC: A, D & E SERIES							
D13	1327	1327	100	100	13	13	20.84
D12	1131	1131	100	100	12	12	17.77
D11	950	950	100	100	11	11	14.92
E13	885	885	150	150	13	13	13.90
D10	786	786	100	100	10	10	12.35
E12	754	754	150	150	12	12	11.84
A13	664	664	200	200	13	13	10.43
D9	636	636	100	100	9	9	9.99
E11	634	634	150	150	11	11	9.96
A12	566	566	200	200	12	12	8.89
E10	524	524	150	150	10	10	8.23
D8	503	503	100	100	8	8	7.90
A11	475	475	200	200	11	11	7.46
E9	424	424	150	150	9	9	6.66
A10	393	393	200	200	10	10	6.17
D7	385	385	100	100	7	7	6.05
E8	335	335	150	150	8	8	5.26
A9	318	318	200	200	9	9	5.00
D6	283	283	100	100	6	6	4.45
E7	257	257	150	150	7	7	4.04
A8	251	251	200	200	8	8	3.94
A7	192	192	200	200	7	7	3.02
E6	189	189	150	150	6	6	2.97
A6	141	141	200	200	6	6	2.21
A5	98	98	200	200	5	5	1.54
RECTANGULAR FABRIC: B SERIES							
B13	1327	393	100	200	13	10	13.51
B12	1131	251	100	200	12	8	10.85
B11	950	251	100	200	11	8	9.43
B10	786	251	100	200	10	8	8.14
B9	636	251	100	200	9	8	6.97
B8	503	251	100	200	8	8	5.92
B7	385	192	100	200	7	7	4.53
B6	283	192	100	200	6	7	3.73

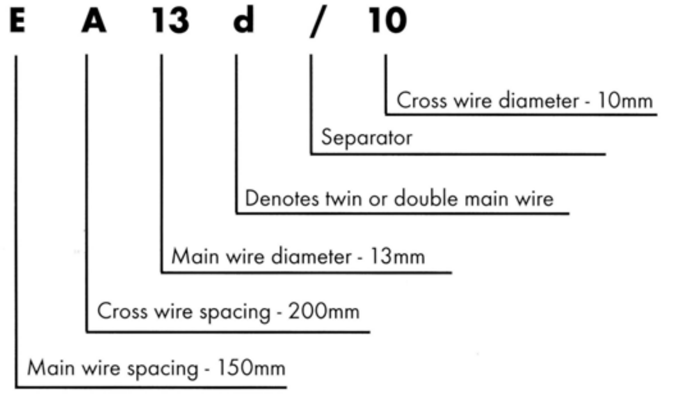
TABLE FOR WELDED WIRE FABRIC (continued)

WWF Ref. No.	Cross- Sectional Area (mm²/m)		Wire Spacing (mm)		Wire Diameter (mm)		Nominal Mass (kg/m²)
	Main	Cross	Main	Cross	Main	Cross	
DESIGNER FABRIC SERIES							
DE12/9	1131	424	100	150	12	9	12.21
DE11/9	950	424	100	150	11	9	10.79
DE10/9	786	424	100	150	10	9	9.50
DE9/9	636	424	100	150	9	9	8.33
DE8/9	503	424	100	150	8	9	7.28
DA13d/10	2655	393	100	200	2X13	10	23.94
EA13d/10	1770	393	150	200	2X13	10	16.99
DA10d/10	1571	393	100	200	2x10	10	15.43
DA12/10	1131	393	100	200	12	10	11.97
EA10d/10	1047	393	150	200	2X10	10	11.31
EA13/10	885	393	150	200	13	10	10.04
DA10/10	786	393	100	200	10	10	9.26
AA13/10	664	393	200	200	13	10	8.30
EA10/10	524	393	150	200	10	10	7.20
DE11/8	950	335	100	150	11	8	10.09
DE10/8	786	335	100	150	10	8	8.80
DE9/8	636	335	100	150	9	8	7.63
DE8/8	503	335	100	150	8	8	6.58
DE7/7	385	257	100	150	7	7	5.04
EA8/7	335	192	150	200	8	7	4.14

Interpretation of Designer Fabric Reference Number:

The first two alphabet denotes the spacing of the Designer fabric, i.e. A for 200 mm spacing, D for 100 mm spacing and E for 150 mm spacing. The diameter of the wire follows the spacing and a small letter "d" after the main wire diameter denotes twin or double wire fabric.



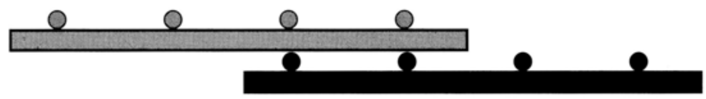


TYPES OF FABRIC LAP

Plain welded wire fabric (plain WWF) bonds to concrete by the positive mechanical anchorage at each intersection. Deformed welded wire fabric (deformed WWF) utilises wire deformation plus the welded intersection for bond and anchorage. According to SS:32, the minimum weld shear stress requirement for plain WWF is 250 MPa and deformed WWF is 140 MPa. Based on this requirement, a lap splice with two welded intersection overlapping is sufficient to transfer the full yield strength for plain WWF. As for deformed WWF the lap length could be reduced depending on the number of welded intersection present with the lap.

Full Yield Strength Layered Lap

- *The most common type lapping used.*
- *Transfer the full yield strength of the reinforcement.*
- *Too great an accumulation of laps can be avoided by staggering the sheet arrangement.*



Full Yield Strength Layered Lap

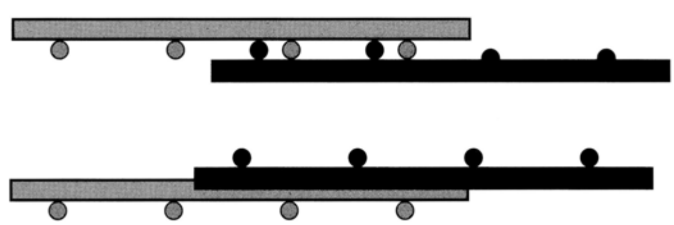
Half Yield Strength Layered Lap

- *Transfer half the yield strength of the reinforcement.*
- *May be use for side laps across beams.*

Half Yield Strength Layered Lap

Reversed or Nested-in-Plane Lap

- *Particularly useful in situations of maximum stress to maintain the lapped reinforcement in the same plane.*



Reversed or Nested-in-PlaneLap

Flying Ends Lap

- *Alternative method of in-plane lapping where one sheet is provided with a lap length overhang without welded intersections.*
- *The lap length is determined as for lapped bars (plain or deformed wires) and, without welded intersection on lapped wires, the ultimate anchorage bond stress of fabric do not apply*

Flying Ends Lap

Non-yield strength transfer splice lap

- *May be used for secondary direction lapping over beam or secondary direction lapping where splice transfer is not important.*

Non-Yield Strength Transfer Splice Lap

BEAM LINK CAGE CONVERSION TABLE FOR PLAIN MILD STEEL BAR		
Link Spacing S_v (mm)	Characteristic Strength of Link Cage f_{yv} = 250 N/mm^2	
	R10	R13
75	T10-125	T13-125
	D10-125	D13-125
	H10-125	H13-125
100	T10-150	T13-150
	D10-150	D13-150
	H10-150	H13-150
125	T10-200	T13-200
	D10-200	D13-200
	H10-200	H13-200
150	T10-250	T13-250
	D10-250	D13-250
	H10-250	H13-250
200	T10-300	T10-200
	D10-300	D10-200
	H10-300	H10-200
250	T10-300	T10-250
	D10-300	D10-250
	H10-300	H10-250
300	T10-300	T10-250
	D10-300	D10-300
	H10-300	H10-300

(1) Table above is derived from the following formulas:

$$\left(\frac{A_{sv}}{S_v}\right) = \left(2 \times \frac{\pi ø^2}{4}\right)\left(\frac{1}{S_v}\right) mm^2/m$$

$$= \frac{(v - v_c)\, b_v}{0.87\, f_{yv}}$$

where,
A_{sv} - Area of two legs of link with diameter ø
b_v – Width of the beam
v – Design shear stress
v_c – Design concrete shear stress

(2) Example for conversion for a specific grade of link cage with a specific spacing using table above.
=> Converting R10-100 link cage to link cage of other characteristic strength.
From table above:- T10-150, D10-150 or H10-150 is equivalent to R10-100.
(Note: Engineer can choose link type i.e. open or close link. If open beam link cage is used, material type for capping link is preferably similar to link cage shall also be adopted)

(3) **Legends:** (a) Prefix 'S' denotes open link cage (e.g. ST, SD, SH)
(b) Prefix 'L' denotes close link cage (e.g. LT, LD, LH)
(c) 'R' denotes links using Plain Mild Bar (f_{yv} = 250N/mm^2)
(d) 'T' denotes links using Tempcore Deformed Wire (f_{yv} = 460N/mm^2)
(e) 'D' denotes links using Deformed Hard Drawn Wire (f_{yv} = 485N/mm^2)
(f) 'H' denotes links using Plain Hard Drawn Wire (f_{yv} = 485N/mm^2)

COLUMN LINK CAGE CONVERSION TABLE FOR PLAIN MILD STEEL BAR			
Link Spacing S_v (mm)	Characteristic Strength of Link Cage f_{yv} = 250 N/mm^2		
	LR8	LR10	LR13
100	LD8-100	LD10-100	LD13-100
	LH8-100	LH10-100	LH13-100
125	LD8-125	LD10-125	LD13-125
	LH8-125	LH10-125	LH13-125
150	LD8-150	LD10-150	LD13-150
	LH8-150	LH10-150	LH13-150
200	LD8-200	LD10-200	LD13-200
	LH8-200	LH10-200	LH13-200
250	LD8-250	LD10-250	LD13-250
	LH8-250	LH10-250	LH13-250
300	LD8-300	LD10-300	LD13-300
	LH8-300	LH10-300	LH13-300

1. Example for conversion for a specific grade of link cage with a specific spacing using table above.
   ⇒ Converting 1 number complete column close link cage LR10-100 to link cage of other characteristic strength.
   From table above: - LD10-150 or LH10-150 is equivalent to LR10-100.

2. **Legends:** (a) Prefix 'L' denotes column close link cage (e.g. LT, LD, LH)
   (b) 'R' denotes links using Plain Mild Bar (f_{yv} = 250N/mm^2)
   (c) 'T' denotes links using Tempcore Deformed Bar (f_{yv} = 460N/mm^2)
   (d) 'D' denotes links using Deformed Hard Drawn Wire (f_{yv} = 485N/mm^2)
   (e) 'H' denotes links using Plain Hard Drawn Wire (f_{yv} = 485N/mm^2)

List of Reinforcement Fabricators

LIST OF REINFORCEMENT FABRICATORS

	Fabricators	Address	Telephone	Fax
1	Asia Steel Welded Mesh Co Ltd	11 Tuas Avenue 3, S639410	861 7333	862 5968
2	Angkasa Marketing (S) Pte Ltd	10 Arumugam Road #09-00, Lion Industrial Building, S409957	759 5973	743 7252
3	B.R.C. Weldmesh (S.E.A.) Pte Ltd	350 Jalan Boon Lay, S619530	265 2333	266 4728
4	Burwill Trading Pte Ltd	35 Pioneer Road, S628503	862 2306	863 2865
5	Eastern Wire Pte Ltd	27 Jalan Buroh, S619483	265 0066	261 8562
6	Econ Industries Pte Ltd	2 Ang Mo Kio St 64, Ang Mo Kio Industrial Park 3, S569084	484 2222	484 2221
7	Legend Building Supplies Pte Ltd	4 Kian Teck Drive, S628821	265 2857	265 2849
8	LiSteel Singapore Pte Ltd	11 Tuas Avenue 16, Jurong, S638929	862 2467	862 1664
9	Natsteel Ltd	22 Tanjong Kling Road, S628048	265 1233	265 8317
10	Panwah Steel Pte Ltd	116 Middle Road, #08-01 ICB Enterprise House, S188972	337 2237	338 8221
11	Viewforth Trading & Engineering Pte Ltd	5 Tuas Avenue 1, S639490	862 0033	861 6448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