

CATALOGUE OF STRUCTURAL PRECAST CONCRETE COMPONENTS

This section features the industry's first effort to produce a catalogue of structural precast components for framed structure. The catalogue covers 3 categories of buildings :

- Commercial and Institutional
- Residential
- Industrial

The catalogue presented here is primarily to assist Architects in selecting column and beam sizes for given spans, live loads and storey heights. Overall dimensions of beams and columns are therefore emphasised. The supplementary CIDB Precast Design Handbook will provide more detailed dimensions for engineering design and production.

Annotations such as HC (hollow core), PB (precast beam), PC (precast column) are used to enable catalogue development. Over time, this catalogue will be fine tuned and improved through usage and feedback from the industry.

An example on selecting the sizes and the relevant design assumptions are provided at the end of this section.

Table 1A

Commercial and Institutional Buildings Recommended Sizes for Precast Slabs and Beams

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Slab Type (mm) and Overall Beam Size for various Structural Floor Element Span S2(m)					
		6.0	7.2	8.4	9.6	10.8	12.0
≤6.0	2.5	PB 40/60	PB 50/60	PB 50/65	PB 60/65	PB 60/70	PB 70/75
	3.0	PB 50/60	PB 50/60	PB 60/65	PB 60/65	PB 60/70	PB 70/75
	4.0	PB 50/60	PB 50/60	PB 60/65	PB 60/70	PB 70/75	PB 70/75
	5.0	PB 50/60	PB 60/60	PB 60/65	PB 70/70	PB 70/75	PB 80/75
>6.0 ; ≤7.2	2.5	PB 50/70	PB 50/70	PB 60/75	PB 60/75	PB 70/80	PB 70/80
	3.0	PB 50/70	PB 50/70	PB 60/75	PB 60/75	PB 70/80	PB 70/80
	4.0	PB 50/70	PB 60/70	PB 60/75	PB 70/80	PB 70/80	PB 80/80
	5.0	PB 50/70	PB 60/70	PB 70/75	PB 70/80	PB 80/80	PB 80/80
>7.2 ; ≤8.4	2.5	PB 50/75	PB 60/75	PB 60/80	PB 70/80	PB 70/85	PB 80/85
	3.0	PB 50/75	PB 60/75	PB 60/80	PB 70/80	PB 70/85	PB 80/90
	4.0	PB 50/75	PB 60/75	PB 70/80	PB 70/85	PB 80/85	PB 80/90
	5.0	PB 60/75	PB 60/75	PB 70/85	PB 80/85	PB 80/85	PB 90/90
>8.4 ; ≤9.6	2.5	PB 50/85	PB 60/85	PB 60/90	PB 70/90	PB 70/95	PB 80/95
	3.0	PB 50/85	PB 60/85	PB 60/90	PB 70/90	PB 80/95	PB 80/100
	4.0	PB 60/85	PB 60/85	PB 70/90	PB 70/95	PB 80/95	PB 90/100
	5.0	PB 60/85	PB 60/85	PB 70/90	PB 80/95	PB 80/95	PB 90/100
>9.6 ; ≤10.8	2.5	PB 50/90	PB 60/90	PB 60/95	PB 70/95	PB 80/100	PB 80/105
	3.0	PB 50/90	PB 60/90	PB 70/100	PB 70/100	PB 80/105	PB 80/105
	4.0	PB 60/95	PB 60/95	PB 70/100	PB 80/105	PB 80/105	PB 90/110
	5.0	PB 60/95	PB 70/95	PB 70/100	PB 80/105	PB 90/105	PB 90/110
>10.8 ; ≤12.0	2.5	PB 50/100	PB 60/100	PB 70/105	PB 70/105	PB 80/110	PB 80/115
	3.0	PB 60/100	PB 60/100	PB 70/105	PB 70/105	PB 80/110	PB 90/115
	4.0	PB 60/100	PB 60/100	PB 70/105	PB 80/110	PB 90/115	PB 90/115
	5.0	PB 60/100	PB 70/100	PB 80/110	PB 80/115	PB 90/115	PB 100/115

Note: 1) PB 50/90 denotes a precast beam of width 50cm (500mm) and overall depth of 90cm (900mm). (See Figure 1).

2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.

3) Refer to Figure 4 for slab sections. Architect and Engineer may wish to check with Precasters for other sizes of hollow core slabs.



Table 1B

**Commercial and Institutional Buildings
Recommended Sizes for Precast Columns (Table 1B/1)**

Structural Beam Span S1(m)	Design Live Loads kN/m2	Square Precast Column for Building Height ≤5 storeys for various Structural Floor Element Span S2 (m)					
		6.0	7.2	8.4	9.6	10.8	12.0
≤ 6.0	2.5	PC 35	PC 40	PC 45	PC 45	PC 50	PC 55
	3.0	PC 35	PC 40	PC 45	PC 50	PC 55	PC 55
	4.0	PC 40	PC 40	PC 45	PC 50	PC 55	PC 60
	5.0	PC 40	PC 45	PC 50	PC 55	PC 60	PC 60
>6.0 ; ≤7.2	2.5	PC 40	PC 45	PC 50	PC 50	PC 55	PC 60
	3.0	PC 40	PC 45	PC 50	PC 55	PC 60	PC 65
	4.0	PC 40	PC 45	PC 50	PC 55	PC 60	PC 65
	5.0	PC 45	PC 50	PC 55	PC 60	PC 65	PC 65
>7.2 ; ≤8.4	2.5	PC 45	PC 45	PC 55	PC 55	PC 60	PC 65
	3.0	PC 45	PC 50	PC 55	PC 60	PC 60	PC 70
	4.0	PC 45	PC 50	PC 55	PC 60	PC 65	PC 70
	5.0	PC 45	PC 50	PC 60	PC 65	PC 70	PC 75
>8.4 ; ≤9.6	2.5	PC 45	PC 50	PC 55	PC 60	PC 65	PC 70
	3.0	PC 45	PC 50	PC 60	PC 60	PC 65	PC 75
	4.0	PC 50	PC 55	PC 60	PC 65	PC 70	PC 75
	5.0	PC 50	PC 55	PC 60	PC 70	PC 75	PC 80
>9.6 ; ≤10.8	2.5	PC 50	PC 55	PC 60	PC 65	PC 70	PC 75
	3.0	PC 50	PC 55	PC 60	PC 65	PC 70	PC 80
	4.0	PC 50	PC 55	PC 65	PC 70	PC 75	PC 80
	5.0	PC 55	PC 60	PC 65	PC 70	PC 80	PC 85
>10.8 ; ≤12.0	2.5	PC 50	PC 55	PC 65	PC 70	PC 75	PC 80
	3.0	PC 55	PC 60	PC 65	PC 70	PC 75	PC 80
	4.0	PC 55	PC 60	PC 65	PC 75	PC 80	PC 85
	5.0	PC 55	PC 65	PC 70	PC 75	PC 85	PC 90

Table 1B

**Commercial and Institutional Buildings
Recommended Sizes for Precast Columns (Table 1B/2)**

Structural Beam Span S1(m)	Design Live Loads kN/m2	Square Precast Column for Building Height > 5 ; ≤ 10 storeys for various Structural Floor Element Span S2 (m)					
		6.0	7.2	8.4	9.6	10.8	12.0
≤ 6.0	2.5	PC 50	PC 55	PC 60	PC 65	PC 70	PC 75
	3.0	PC 50	PC 55	PC 60	PC 65	PC 70	PC 80
	4.0	PC 50	PC 55	PC 65	PC 70	PC 75	PC 80
	5.0	PC 55	PC 60	PC 65	PC 70	PC 80	PC 85
>6.0 ; ≤7.2	2.5	PC 55	PC 60	PC 65	PC 70	PC 80	PC 85
	3.0	PC 55	PC 60	PC 65	PC 70	PC 80	PC 85
	4.0	PC 55	PC 60	PC 70	PC 75	PC 85	PC 90
	5.0	PC 60	PC 65	PC 70	PC 80	PC 85	PC 90
>7.2 ; ≤8.4	2.5	PC 60	PC 65	PC 70	PC 75	PC 85	PC 90
	3.0	PC 60	PC 65	PC 75	PC 80	PC 85	PC 95
	4.0	PC 60	PC 65	PC 75	PC 85	PC 90	PC 95
	5.0	PC 65	PC 70	PC 75	PC 85	PC 90	PC 100
>8.4 ; ≤9.6	2.5	PC 60	PC 70	PC 75	PC 80	PC 90	PC 100
	3.0	PC 65	PC 70	PC 80	PC 85	PC 90	PC 100
	4.0	PC 65	PC 70	PC 80	PC 90	PC 95	PC 105
	5.0	PC 65	PC 75	PC 80	PC 90	PC 100	PC 105
>9.6 ; ≤10.8	2.5	PC 65	PC 70	PC 80	PC 85	PC 95	PC 105
	3.0	PC 65	PC 75	PC 85	PC 90	PC 95	PC 105
	4.0	PC 70	PC 75	PC 85	PC 95	PC 100	PC 110
	5.0	PC 70	PC 80	PC 90	PC 95	PC 105	PC 110
>10.8 ; ≤12.0	2.5	PC 70	PC 75	PC 85	PC 90	PC 100	PC 110
	3.0	PC 70	PC 80	PC 85	PC 95	PC 105	PC 110
	4.0	PC 75	PC 80	PC 90	PC 100	PC 110	PC 115
	5.0	PC 75	PC 85	PC 95	PC 100	PC 110	PC 120

Table 1B

Commercial and Institutional Buildings Recommended Sizes for Precast Columns (Table 1B/3)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Square Precast Column Building Height > 10 ; ≤ 15 storeys for various Structural Floor Element Span S2 (m)					
		6.0	7.2	8.4	9.6	10.8	12.0
≤ 6.0	2.5	PC 60	PC 65	PC 75	PC 80	PC 85	PC 95
	3.0	PC 60	PC 65	PC 75	PC 80	PC 85	PC 95
	4.0	PC 60	PC 70	PC 75	PC 85	PC 90	PC 100
	5.0	PC 65	PC 70	PC 80	PC 85	PC 95	PC 100
>6.0 ; ≤7.2	2.5	PC 65	PC 70	PC 80	PC 85	PC 95	PC 105
	3.0	PC 65	PC 70	PC 80	PC 85	PC 95	PC 105
	4.0	PC 70	PC 75	PC 85	PC 90	PC 100	PC 105
	5.0	PC 70	PC 75	PC 85	PC 95	PC 105	PC 110
>7.2 ; ≤8.4	2.5	PC 70	PC 75	PC 85	PC 95	PC 100	PC 110
	3.0	PC 70	PC 80	PC 90	PC 95	PC 105	PC 115
	4.0	PC 75	PC 80	PC 90	PC 100	PC 110	PC 115
	5.0	PC 75	PC 85	PC 95	PC 105	PC 110	PC 120
>8.4 ; ≤9.6	2.5	PC 75	PC 80	PC 95	PC 100	PC 110	PC 120
	3.0	PC 75	PC 85	PC 95	PC 100	PC 110	PC 120
	4.0	PC 80	PC 85	PC 95	PC 105	PC 115	PC 125
	5.0	PC 80	PC 90	PC 100	PC 110	PC 120	PC 125
>9.6 ; ≤10.8	2.5	PC 80	PC 85	PC 100	PC 105	PC 115	PC 125
	3.0	PC 80	PC 90	PC 100	PC 105	PC 120	PC 130
	4.0	PC 85	PC 90	PC 105	PC 115	PC 125	PC 130
	5.0	PC 85	PC 95	PC 105	PC 115	PC 125	PC 135
>10.8 ; ≤12.0	2.5	PC 85	PC 90	PC 105	PC 110	PC 125	PC 135
	3.0	PC 85	PC 95	PC 105	PC 115	PC 125	PC 135
	4.0	PC 90	PC 95	PC 110	PC 125	PC 130	PC 140
	5.0	PC 90	PC 100	PC 110	PC 125	PC 135	PC 140

Note for Table 1B:

- 1) PC 70 denotes a **square precast column** of size **700x700 mm**.
- 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.
- 3) Rectangular columns of equivalent cross sectional area can be used provided slenderness limits are observed.

Table 2A

**Residential Buildings
Recommended Sizes for Precast Slabs and Beams**

Structural Beam Span S1(m)	Design Live Loads kN/m2	Precast Slab Type (mm) and Overall Beam Size for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤3.6	1.5	PB 20/40	PB 20/40	PB 20/40	PB 20/40	PB 20/45
	2.0	PB 20/40	PB 20/40	PB 20/40	PB 20/45	PB 40/50
	3.0	PB 20/40	PB 20/40	PB 20/40	PB 20/45	PB 40/50
>3.6 ; ≤4.8	1.5	PB 20/45	PB 20/45	PB 20/45	PB 20/45	PB 25/50
	2.0	PB 20/45	PB 20/45	PB 20/45	PB 25/50	PB 45/55
	3.0	PB 20/45	PB 20/45	PB 20/50	PB 25/50	PB 45/55
>4.8 ; ≤6.0	1.5	PB 20/50	PB 20/50	PB 20/55	PB 25/55	PB 30/55
	2.0	PB 20/50	PB 20/50	PB 20/55	PB 25/55	PB 45/60
	3.0	PB 20/50	PB 20/50	PB 25/55	PB 30/55	PB 50/60
>6.0 ; ≤7.2	1.5	PB 20/60	PB 20/60	PB 20/65	PB 25/65	PB 30/65
	2.0	PB 20/60	PB 20/60	PB 20/60	PB 25/65	PB 50/70
	3.0	PB 20/60	PB 20/60	PB 25/65	PB 30/65	PB 50/70

- Note :
- 1) PB 20/40 denotes a precast beam of width b, 20cm (200mm) overall depth D, of 40cm(400mm) (see Figure 1 and 3).
 - 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.
 - 3) Refer to Figure 4 for slab sections. Architect and Engineer may wish to check with the Precasters for other sizes of hollow core slabs.

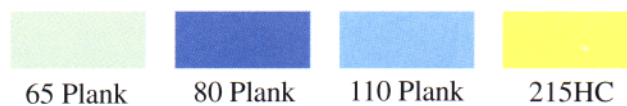


Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 1)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height ≤ 5 storey for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤3.6	1.5	-	-	-	PC 25/35	PC 25/35
	2.0	-	-	-	PC 25/35	PC 25/50
	3.0	-	-	-	PC 25/35	PC 25/50
>3.6 ; ≤4.8	1.5	-	-	PC 25/35	PC 25/50	PC 25/50
	2.0	-	-	PC 25/35	PC 25/50	PC 25/65
	3.0	-	-	PC 25/35	PC 25/50	PC 25/65
>4.8 ; ≤6.0	1.5	-	PC 25/35	PC 25/50	PC 25/50	PC 30/55
	2.0	-	PC 25/35	PC 25/50	PC 25/65	PC 25/80
	3.0	PC 25/35	PC 25/35	PC 25/50	PC 25/65	PC 30/70
>6.0 ; ≤7.2	1.5	PC 25/35	PC 25/35	PC 25/50	PC 25/65	PC 30/70
	2.0	PC 25/35	PC 25/35	PC 25/50	PC 25/80	PC 30/70
	3.0	PC 25/35	PC 25/50	PC 25/65	PC 30/70	PC 30/80

Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 2)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height > 5 ; ≤ 10 storey for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤3.6	1.5	-	PC 25/35	PC 25/50	PC 25/65	PC 25/80
	2.0	-	PC 25/35	PC 25/50	PC 25/65	PC 25/80
	3.0	PC 25/35	PC 25/35	PC 25/50	PC 25/65	PC 25/80
>3.6 ; ≤4.8	1.5	PC 25/35	PC 25/50	PC 25/65	PC 25/80	PC 25/100
	2.0	PC 25/35	PC 25/50	PC 25/65	PC 25/80	PC 25/100
	3.0	PC 25/35	PC 25/50	PC 25/65	PC 25/100	PC 25/120
>4.8 ; ≤6.0	1.5	PC 25/50	PC 25/50	PC 25/80	PC 25/100	PC 30/100
	2.0	PC 25/50	PC 25/65	PC 25/80	PC 25/100	PC 25/120
	3.0	PC 25/50	PC 25/65	PC 25/80	PC 25/120	PC 30/120
>6.0 ; ≤7.2	1.5	PC 25/50	PC 25/65	PC 25/100	PC 25/120	PC 30/120
	2.0	PC 25/65	PC 25/65	PC 25/100	PC 25/120	PC 30/140
	3.0	PC 25/65	PC 25/80	PC 25/100	PC 30/120	PC 30/140

Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 3)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height > 10 ; ≤ 15 storey for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤3.6	1.5	PC 25/35	PC 25/50	PC 25/65	PC 25/80	PC 25/100
	2.0	PC 25/35	PC 25/50	PC 25/65	PC 25/80	PC 25/120
	3.0	PC 25/50	PC 25/50	PC 25/80	PC 25/100	PC 25/120
>3.6 ; ≤4.8	1.5	PC 25/50	PC 25/65	PC 25/80	PC 25/100	PC 25/145
	2.0	PC 25/50	PC 25/65	PC 25/100	PC 25/120	PC 25/145
	3.0	PC 25/50	PC 25/65	PC 25/100	PC 25/120	PC 25/170
>4.8 ; ≤6.0	1.5	PC 25/65	PC 25/80	PC 25/120	PC 25/145	PC 30/140
	2.0	PC 25/65	PC 25/80	PC 25/120	PC 25/170	PC 25/195
	3.0	PC 25/80	PC 25/80	PC 25/120	PC 25/170	PC 30/160
>6.0 ; ≤7.2	1.5	PC 25/80	PC 25/100	PC 25/145	PC 25/170	PC 30/185
	2.0	PC 25/80	PC 25/100	PC 25/145	PC 25/195	PC 30/185
	3.0	PC 25/80	PC 25/100	PC 25/145	PC 30/160	PC 35/185

Note: 1) PC 25/35 denotes a rectangular precast column of size 25cm(250mm) x 35cm(350mm).
 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.

Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 4)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height >15 ; ≤ 20 storeys for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤ 3.6	1.5	PC 25/50	PC 25/65	PC 25/80	PC 25/120	PC 25/145
	2.0	PC 25/50	PC 25/65	PC 25/100	PC 25/120	PC 25/145
	3.0	PC 25/65	PC 25/65	PC 25/100	PC 25/145	PC 25/170
>3.6 ; ≤4.8	1.5	PC 25/65	PC 25/80	PC 25/120	PC 25/145	PC 25/195
	2.0	PC 25/65	PC 25/80	PC 25/120	PC 25/170	PC 25/195
	3.0	PC 25/80	PC 25/100	PC 25/120	PC 25/170	PC 30/185
>4.8 ; ≤6.0	1.5	PC 25/80	PC 25/100	PC 25/145	PC 25/195	PC 35/185
	2.0	PC 25/100	PC 25/100	PC 25/145	PC 25/195	PC 35/185
	3.0	PC 25/100	PC 25/120	PC 25/170	PC 30/185	PC 35/185
>6.0 ; ≤7.2	1.5	PC 25/100	PC 25/120	PC 25/170	PC 30/185	PC 35/200
	2.0	PC 25/100	PC 25/120	PC 25/195	PC 35/185	PC 40/200
	3.0	PC 25/120	PC 25/145	PC 25/195	PC 35/185	PC 40/200

Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 5)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height > 20 ; ≤ 25 storeys for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤ 3.6	1.5	PC 25/65	PC 25/80	PC 25/100	PC 25/145	PC 25/170
	2.0	PC 25/65	PC 25/80	PC 25/120	PC 25/145	PC 25/195
	3.0	PC 25/80	PC 25/80	PC 25/120	PC 25/170	PC 25/195
>3.6 ; ≤4.8	1.5	PC 25/80	PC 25/100	PC 25/145	PC 25/195	PC 25/195
	2.0	PC 25/100	PC 25/100	PC 25/145	PC 25/195	PC 35/185
	3.0	PC 25/100	PC 25/120	PC 25/170	PC 30/185	PC 35/185
>4.8 ; ≤6.0	1.5	PC 25/100	PC 25/120	PC 25/195	PC 30/185	PC 35/200
	2.0	PC 25/120	PC 25/145	PC 25/195	PC 35/200	PC 40/200
	3.0	PC 25/120	PC 25/145	PC 25/195	PC 35/200	PC 40/200
>6.0 ; ≤7.2	1.5	PC 25/120	PC 25/170	PC 30/185	PC 35/200	PC 45/200
	2.0	PC 25/145	PC 25/170	PC 30/185	PC 40/200	PC 50/200
	3.0	PC 25/145	PC 25/170	PC 35/185	PC 40/200	PC 50/200

Table 2B Residential Buildings Recommended Sizes for Precast Columns (Table 2B/ 6)

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Column Size b x h (mm) for Building Height >25 ; ≤30 storeys for various Structural Floor Element Span S2 (m)				
		3.0	3.6	4.8	6.0	7.2
≤ 3.6	1.5	PC 25/80	PC 25/100	PC 25/120	PC 25/170	PC 30/185
	2.0	PC 25/80	PC 25/100	PC 25/145	PC 25/195	PC 30/185
	3.0	PC 25/80	PC 25/100	PC 25/145	PC 25/195	PC 35/185
>3.6 ; ≤4.8	1.5	PC 25/100	PC 25/120	PC 25/170	PC 30/185	PC 35/200
	2.0	PC 25/100	PC 25/120	PC 25/170	PC 35/185	PC 35/200
	3.0	PC 25/120	PC 25/145	PC 25/195	PC 35/185	PC 40/200
>4.8 ; ≤6.0	1.5	PC 25/120	PC 25/145	PC 30/185	PC 35/200	PC 45/200
	2.0	PC 25/145	PC 25/170	PC 30/185	PC 40/200	PC 50/200
	3.0	PC 25/145	PC 25/170	PC 35/185	PC 40/200	PC 50/200
>6.0 ; ≤7.2	1.5	PC 25/145	PC 25/195	PC 35/185	PC 40/200	PC 55/200
	2.0	PC 25/170	PC 25/195	PC 35/185	PC 45/200	PC 55/200
	3.0	PC 25/170	PC 25/195	PC 35/200	PC 50/200	PC 60/200

Note: 1) PC 25/35 denotes a rectangular precast column of size 25cm(250mm) x 35cm(350mm).
 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.

Table 2C Residential Buildings Recommended Thickness for Load Bearing Walls

Total number of floors (n) supported by the wall	Design Live Load (kN/m ²)	Wall thickness (mm) supporting statically loaded spans (m)						
		≤ 3.6	3.6 - 4.2	4.2 - 4.8	4.8 - 5.4	5.4 - 6.0	6.0 - 6.6	6.6 - 7.2
n ≤ 5	1.5	150	150	150	150	150	150	150
	2.0	150	150	150	150	150	150	150
5 < n ≤ 10	1.5	150	150	175	175	175	175	200
	2.0	150	150	175	175	175	200	200
10 < n ≤ 15	1.5	175	175	175	200	200	225	225
	2.0	175	175	200	200	225	225	225
15 < n ≤ 20	1.5	175	200	200	225	225	225	275
	2.0	175	200	225	225	225	250	300
20 < n ≤ 25	1.5	200	200	225	225	275	300	300
	2.0	200	225	225	250	275	300	300
25 < n ≤ 30	1.5	200	225	225	275	300	300	300
	2.0	225	225	250	275	300	300	300
30 < n ≤ 35	1.5	225	225	275	300	300	300	300
	2.0	225	250	300	300	300	300	300



Grade 30 Concrete



Grade 35 Concrete



Grade 40 Concrete



Grade 45 Concrete



Grade 50 Concrete

Table 3A

Industrial Buildings Recommended Sizes for Precast Slabs and Beams

Structural Beam Span S1(m)	Design Live Loads kN/m ²	Precast Slab Type (mm) and Overall Beam Size for various Structural Floor Element Span S2 (m)				
		7.2	8.4	9.6	10.8	12.0
≤7.2	5.0	PB 60/75	PB 60/75	PB 70/80	PB 70/80	PB 80/80
	7.5	PB 60/75	PB 70/75	PB 80/80	PB 80/80	PB 90/85
	12.5	PB 80/75	PB 80/80	PB 90/80	PB 100/85	240X80DTB PB 110/90
	15.0	PB 80/80	PB 90/85	PB 100/85	PB 100/90	240X90DTB PB 110/100
	20.0	PB 90/80	PB 110/80	PB 110/85	240X100DTB PB 110/110	240X120DTB PB 110/130
>7.2 ; ≤8.4	5.0	PB 60/85	PB 70/80	PB 70/85	PB 80/85	PB 80/90
	7.5	PB 70/80	PB 80/80	PB 80/85	PB 90/90	PB 100/90
	12.5	PB 80/80	PB 90/85	PB 100/90	PB 100/95	240X80DTB PB 120/90
	15.0	PB 90/85	PB 100/90	PB 110/90	PB 110/95	240X90DTB PB 120/100
	20.0	PB 100/90	PB 110/90	PB 120/95	240X100DTB PB 130/110	240X120DTB PB 130/130
>8.4 ; ≤9.6	5.0	PB 60/90	PB 70/90	PB 70/95	PB 80/95	PB 90/95
	7.5	PB 70/90	PB 80/90	PB 80/95	PB 90/100	PB 100/100
	12.5	PB 90/90	PB 90/95	PB 100/100	PB 110/105	240X80DTB PB 120/100
	15.0	PB 90/95	PB 100/100	PB 110/105	PB 120/105	240X90DTB PB 130/105
	20.0	PB 100/100	PB 120/100	PB 130/105	240X100DTB PB 140/110	240X120DTB PB 140/130
>9.6 ; ≤10.8	5.0	PB 60/100	PB 70/100	PB 80/105	PB 80/105	PB 90/105
	7.5	PB 70/100	PB 80/100	PB 90/105	PB 90/105	PB 100/110
	12.5	PB 90/100	PB 100/105	PB 110/110	PB 110/110	240X80DTB PB 130/110
	15.0	PB 90/105	PB 100/110	PB 120/110	PB 120/115	240X90DTB PB 130/115
	20.0	PB 110/110	PB 120/110	PB 130/115	240X100DTB PB 140/120	240X120DTB PB 140/130
>10.8 ; ≤12.0	5.0	PB 60/110	PB 70/110	PB 80/115	PB 90/115	PB 90/115
	7.5	PB 70/110	PB 80/110	PB 90/115	PB 100/115	PB 100/120
	12.5	PB 90/110	PB 100/115	PB 110/115	PB 120/120	240X80DTB PB 130/120
	15.0	PB 100/115	PB 110/120	PB 120/120	PB 130/125	240X90DTB PB 140/125
	20.0	PB 110/115	PB 120/115	PB 130/120	240X100DTB PB 140/130	240X120DTB PB 150/135

- Note : 1) PB 50/90 denotes a precast beam of width 50cm (500mm) and overall depth of 90cm (900mm). See Figure 1 and 2.
 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.
 3) DTB denotes **Double Tee Beam**.
 4) Refer to Figure 4 for slab sections. Architect and Engineer may wish to check with the Precasters for other sizes of hollow core slabs.



Table 3B Industrial Buildings
Recommended Sizes for Precast Columns (Table 3B/ 1)

Structural Beam Span	Design Live Loads	Precast Column Size b x h (mm) for Building Height ≤ 5 storeys for various Structural Floor Element Span S2 (m)				
		7.2	8.4	9.6	10.8	12.0
S1(m)	kN/m ²					
≤7.2	5.0	PC 50	PC 55	PC 60	PC 65	PC 70
	7.5	PC 55	PC 60	PC 65	PC 70	PC 75
	12.5	PC 60	PC 70	PC 75	PC 80	PC 80
	15.0	PC 65	PC 70	PC 80	PC 85	PC 85
	20.0	PC 75	PC 80	PC 85	PC 90	PC 95
>7.2 ; ≤8.4	5.0	PC 55	PC 60	PC 65	PC 70	PC 75
	7.5	PC 60	PC 65	PC 70	PC 75	PC 80
	12.5	PC 65	PC 75	PC 80	PC 85	PC 85
	15.0	PC 70	PC 80	PC 85	PC 90	PC 90
	20.0	PC 80	PC 85	PC 90	PC 95	PC 100
>8.4 ; ≤9.6	5.0	PC 60	PC 60	PC 70	PC 75	PC 80
	7.5	PC 65	PC 70	PC 75	PC 80	PC 85
	12.5	PC 70	PC 80	PC 85	PC 90	PC 95
	15.0	PC 75	PC 85	PC 90	PC 95	PC 100
	20.0	PC 85	PC 90	PC 100	PC 105	PC 110
>9.6 ; ≤10.8	5.0	PC 60	PC 65	PC 75	PC 80	PC 85
	7.5	PC 65	PC 70	PC 80	PC 85	PC 90
	12.5	PC 75	PC 85	PC 90	PC 95	PC 100
	15.0	PC 80	PC 90	PC 95	PC 100	PC 105
	20.0	PC 90	PC 95	PC 105	PC 110	PC 115
>10.8 ; ≤12.0	5.0	PC 65	PC 70	PC 75	PC 80	PC 85
	7.5	PC 70	PC 75	PC 85	PC 90	PC 95
	12.5	PC 80	PC 90	PC 95	PC 100	PC 105
	15.0	PC 85	PC 95	PC 100	PC 110	PC 110
	20.0	PC 95	PC 105	PC 110	PC 115	PC 120

Table 3B Industrial Buildings
Recommended Sizes for Precast Columns (Table 3B/ 2)

Structural Beam Span	Design Live Loads	Precast Column Size b x h (mm) for Building Height > 5 ; ≤ 8 storeys for various Structural Floor Element Span S2 (m)				
		7.2	8.4	9.6	10.8	12.0
S1(m)	kN/m ²					
≤7.2	5.0	PC 60	PC 65	PC 70	PC 75	PC 80
	7.5	PC 65	PC 70	PC 75	PC 80	PC 85
	12.5	PC 70	PC 80	PC 85	PC 90	PC 90
	15.0	PC 75	PC 80	PC 90	PC 95	PC 95
	20.0	PC 80	PC 90	PC 95	PC 100	PC 105
>7.2 ; ≤8.4	5.0	PC 65	PC 70	PC 75	PC 80	PC 90
	7.5	PC 70	PC 75	PC 80	PC 90	PC 95
	12.5	PC 75	PC 85	PC 90	PC 95	PC 100
	15.0	PC 80	PC 90	PC 95	PC 100	PC 105
	20.0	PC 90	PC 95	PC 100	PC 105	PC 110
>8.4 ; ≤9.6	5.0	PC 70	PC 75	PC 80	PC 85	PC 95
	7.5	PC 75	PC 80	PC 85	PC 95	PC 100
	12.5	PC 80	PC 90	PC 100	PC 105	PC 105
	15.0	PC 85	PC 95	PC 100	PC 110	PC 110
	20.0	PC 95	PC 100	PC 110	PC 115	PC 120
>9.6 ; ≤10.8	5.0	PC 75	PC 80	PC 85	PC 95	PC 100
	7.5	PC 80	PC 85	PC 90	PC 100	PC 105
	12.5	PC 85	PC 95	PC 105	PC 110	PC 110
	15.0	PC 90	PC 100	PC 110	PC 115	PC 115
	20.0	PC 100	PC 110	PC 115	PC 120	PC 130
>10.8 ; ≤12.0	5.0	PC 75	PC 85	PC 90	PC 100	PC 105
	7.5	PC 80	PC 90	PC 100	PC 105	PC 110
	12.5	PC 90	PC 100	PC 110	PC 115	PC 120
	15.0	PC 95	PC 105	PC 115	PC 120	PC 125
	20.0	PC 105	PC 115	PC 125	PC 130	PC 135

- Note : 1) PC 50 denotes a **Square Precast Column** of size 50cm (500mm)x50cm(500mm).
 2) The sizes in the above table are recommended sizes. Engineers are to carry out detailed design according to the relevant design code.
 3) Column size in **Red** indicates column self-weight > 25 tons.

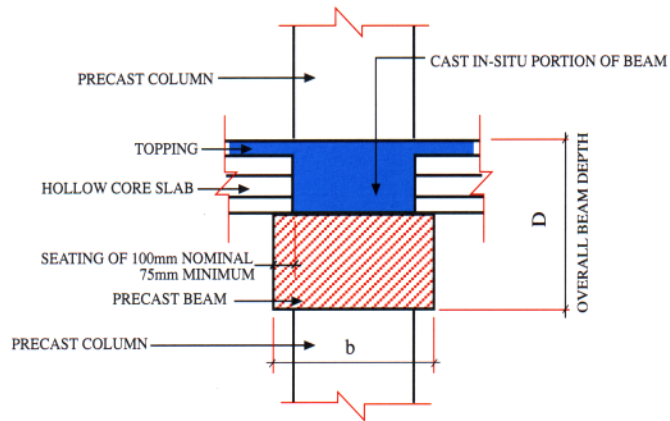


FIGURE 1 HOLLOW CORE SLAB ON PRECAST BEAM

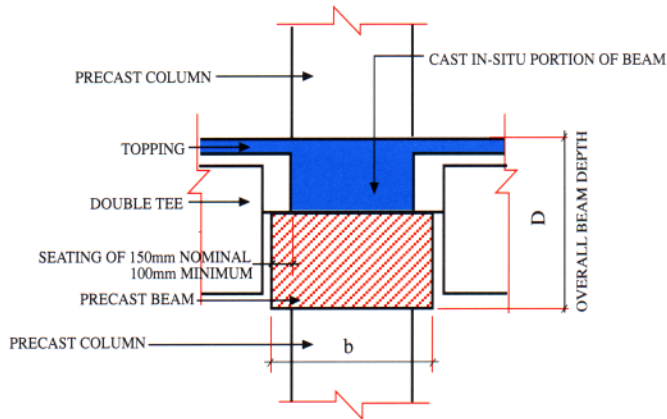


FIGURE 2 DOUBLE TEE BEAM-SLAB ON PRECAST BEAM

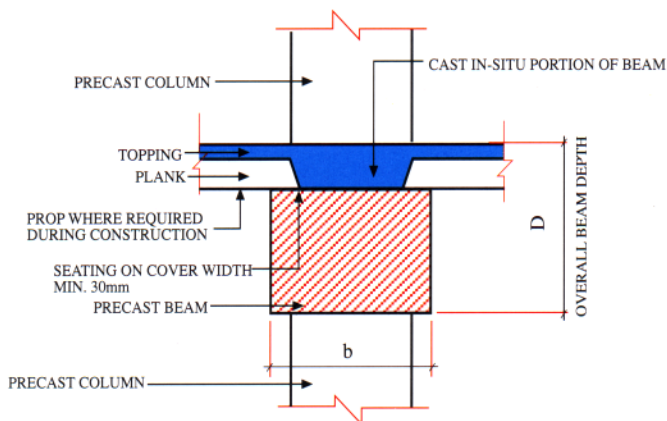
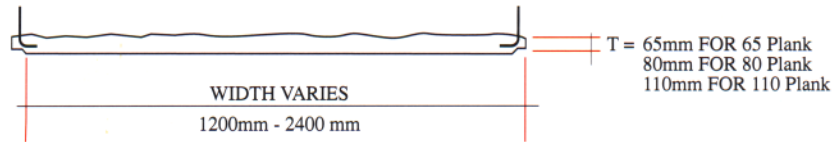
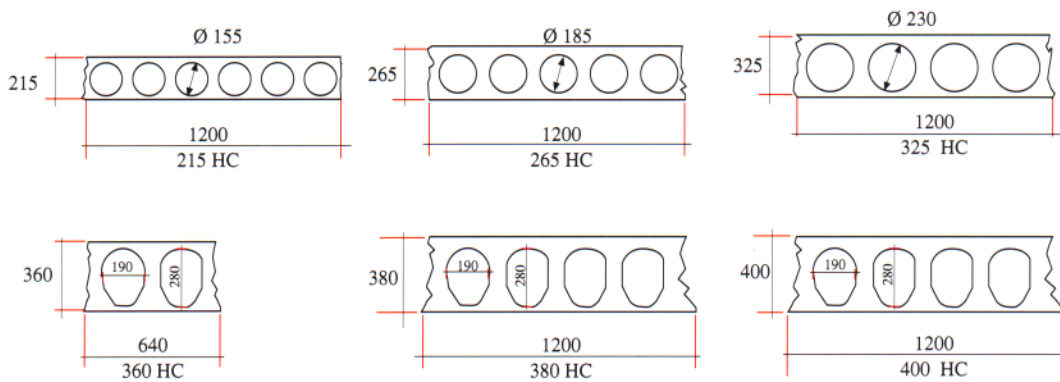


FIGURE 3 PLANKS ON PRECAST BEAM

PLANKS



HOLLOW CORE SLABS



DOUBLE TEE BEAM-SLABS

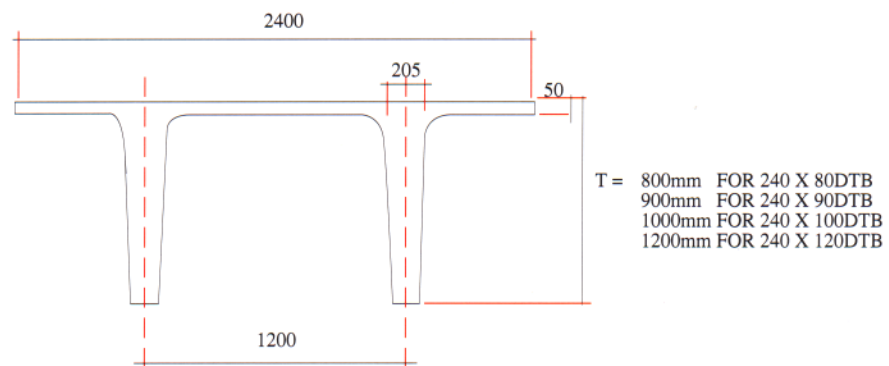


FIGURE 4 TYPICAL SECTION OF VARIOUS PRECAST SLAB ELEMENTS

Design Assumptions and Notes

1. Fire resistance
 - = 2 hrs Commercial/Institutional/Industrial Buildings
 - = 1.5 hrs Residential Buildings

2. Superimposed dead loads = 2.7 kN/m²
 - Commercial/Institutional/Industrial Buildings 1.2 for finishes, 1.0 for partition, 0.5 for services
 - Residential Buildings 1.2 for finishes, 1.5 for partition

3. For column sizing the following apply:-
 - a. only total vertical dead and live loads are considered;
 - b. imposed live load reduction is applied;
 - c. nominal 2% steel content assumed;
 - d. floor to floor height assumed;
 - 4.2m for Commercial and Institutional Buildings
 - 6.0m for Industrial Buildings
 - 3.5m for Residential Buildings
 - e. minimum dimensions of rectangular column shown are based on fire resistance requirement and the slenderness limit of braced short column of nominal floor to floor height;
 - f. limits on slenderness for unbraced short column are more stringent. If in doubt, competent advice should be sought;
 - g. if smaller dimensions less than that given in the tables are to be used, slender column considerations apply and additional checks are required;
 - h. reduction of column size at upper floors for tall building should be considered and reduced sizes can be obtained by the use of tables for building of lower height; and
 - i. crantage, access and connection considerations may preclude the use of precast columns.

4. For beam sizing the following apply:-
 - a. precast beam is normal reinforced precast beam;
 - b. reduction of overall beam depth may be achieved by use of prestressed precast beams or precast inverted tee beams; and
 - c. crantage and access considerations may preclude the use of precast beams.

5. Concrete grades assumed:-

Components	Concrete Grade (N/mm ²)	Types of Buildings
hollow core slabs	50	All Buildings
prestressed planks	40	All Buildings
double tee beam-slabs	35	All Buildings
precast beams and columns	35	Commercial/Institutional/Industrial Buildings
	30	Residential Buildings
cast-insitu portion of beams (including topping)	35	Commercial/Institutional/Industrial Buildings
	30	Residential Buildings

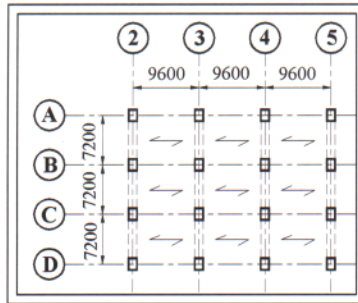
6. Considerations for robustness and stability under lateral loads have to be separately assessed.

7. Thickness of topping:-
 - 65mm at supports; 50mm at mid-span for 215HC.
 - 75mm at supports; 50mm at mid-span for all other HC.
 - 50mm for DTB.
 - 60mm for 65Plank; 70mm for 80Plank, 110Plank.

8. Design Assumptions for Load Bearing Plain Wall in Residential Buildings
 - a. Fire Resistance = 1.5 hrs
 - b. Superimposed dead load assumed = 1.2 kN/m² for finishes
= 1.0 kN/m² for partition
 - c. Walls are assumed pinned at each floor and braced by cross walls.
 - d. Maximum floor height at 3.5m is assumed.
 - e. All walls assumed minimum reinforcement for shrinkage cracking control i.e. 0.13% of A_c (A_c denotes area of concrete section).
 - f. Live load reduction is not used. However for live load greater than 2.0 kN/m², live load reduction should be used for more economical wall design.

Example: Preliminary sizing of precast slab, precast beam and precast column

Consider the typical floor layout as shown for an Office Building:-



Design criteria:-

1. Design live load = 4.0 kN/m²
2. Design imposed dead loads :
 - services = 0.5 kN/m²
 - partition = 1.0 kN/m²
 - finishes = 1.2 kN/m²
3. Roof :
 - design live load = 1.5 kN/m²
 - design imposed dead loads = 2.0 kN/m²
4. Building is 7-storey with floor to floor height of 4.5m.
5. Structural stability is provided by shear cores at other location.
6. Headroom to be minimum 3.6m.
7. Concrete grade 35.

Preliminary sizing using the tabulation of recommended sizes for precast elements:-

Step 1. Provide for precast slab to span parallel to the alphabetical grid and precast beam to span parallel to the numeric grid.

Step 2. Consider structures between Grid 3 to 5 and Grid A to C.

Hence,

- (i) precast beam span, S1 = 7.2m
- (ii) precast slab span, S2 = 9.6m
- (iii) design live load = 4.0 kN/m²

Step 3. **Precast slab and beam:-**

Refer to Table 1A and with structural span S1 being >6.0, ≤7.2m,
 design live load = 4.0 kN/m² and
 structural floor element span S2 = 9.6m,

hence,

- (i) precast slab = 325 HC
- (ii) precast beam = PB70/80 (b=700mm ,D=800mm)

Step 4. **Column size:-**

Refer to Table 1B/2 and with building height of 7-storey within the range of
 >5, ≤10 storey, structural span S1 being >6.0, ≤7.2m,

- design live load = 4.0 kN/m² and
- structural floor element span S2 = 9.6m,
- hence, square column = PC75 (750mm x750mm)



Other Structural Components

Precast Staircase



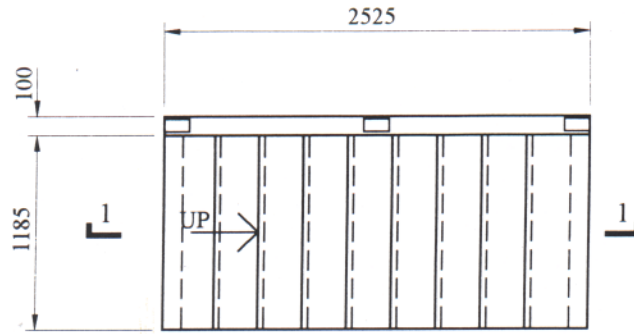
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Precast staircase offers consistent step dimensions and good surface finish. Natural granite or coloured tile finish can also be incorporated with the precast unit.

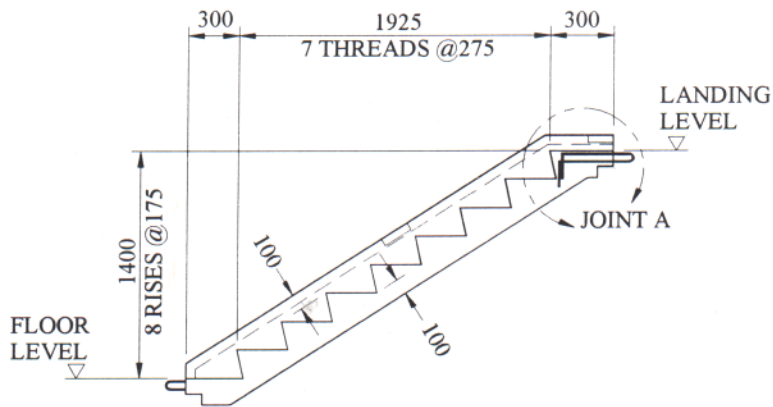
A range of precast staircase types is shown in the table below.

Type	Description	Suitable for buildings with floor-to-floor height of (mm)
1	8 risers @ 175mm = 1400mm	2800
2	9 risers @ 175mm = 1575mm	3150
3	10 risers @ 175mm = 1750mm	3500
4	10 risers @ 160mm = 1600mm	3200
5	10 risers @ 165mm = 1650mm	3300
6	12 risers @ 150mm = 1800mm	3600

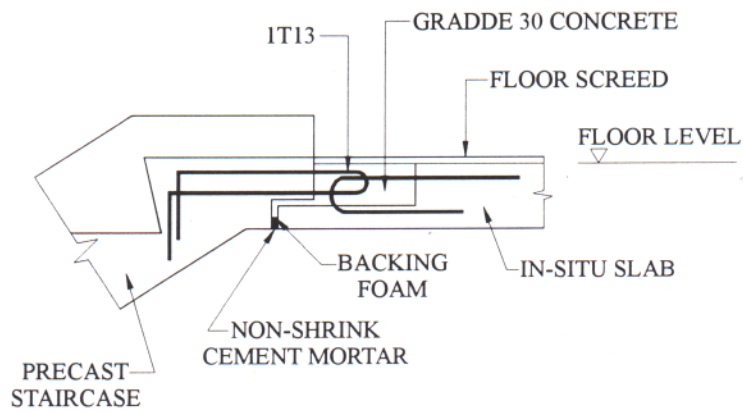
Precast Staircase (Type 1)



PLAN



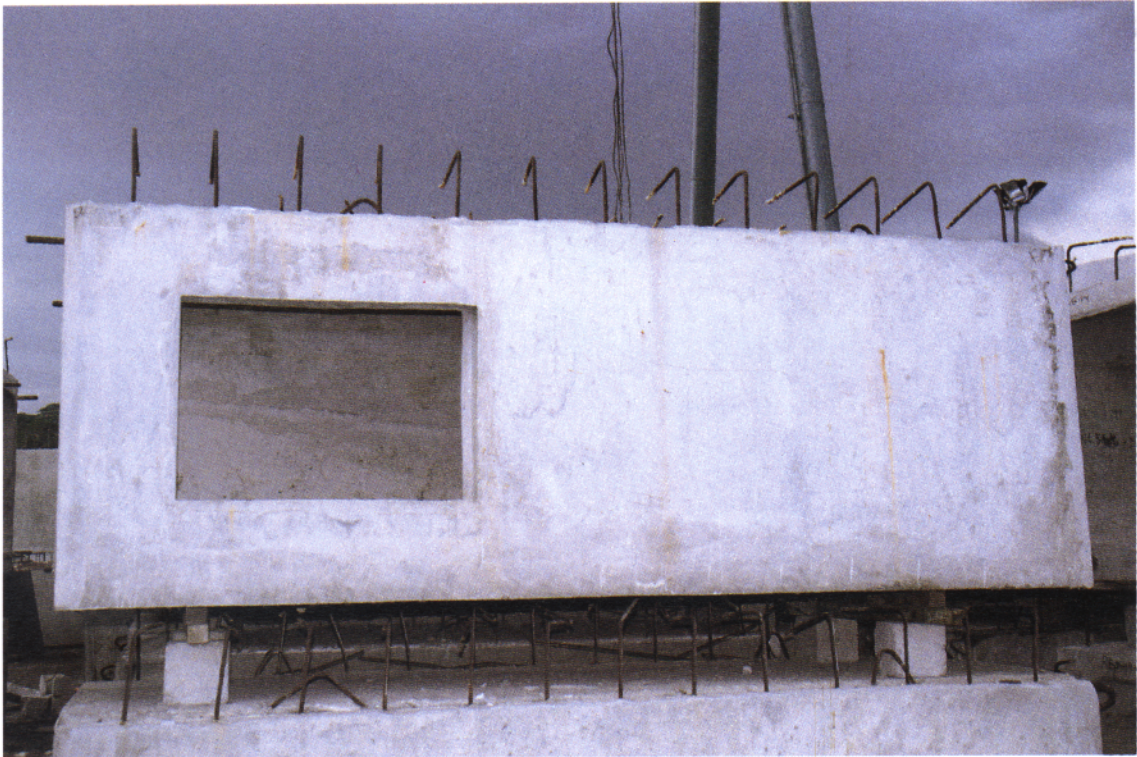
SECTION 1-1



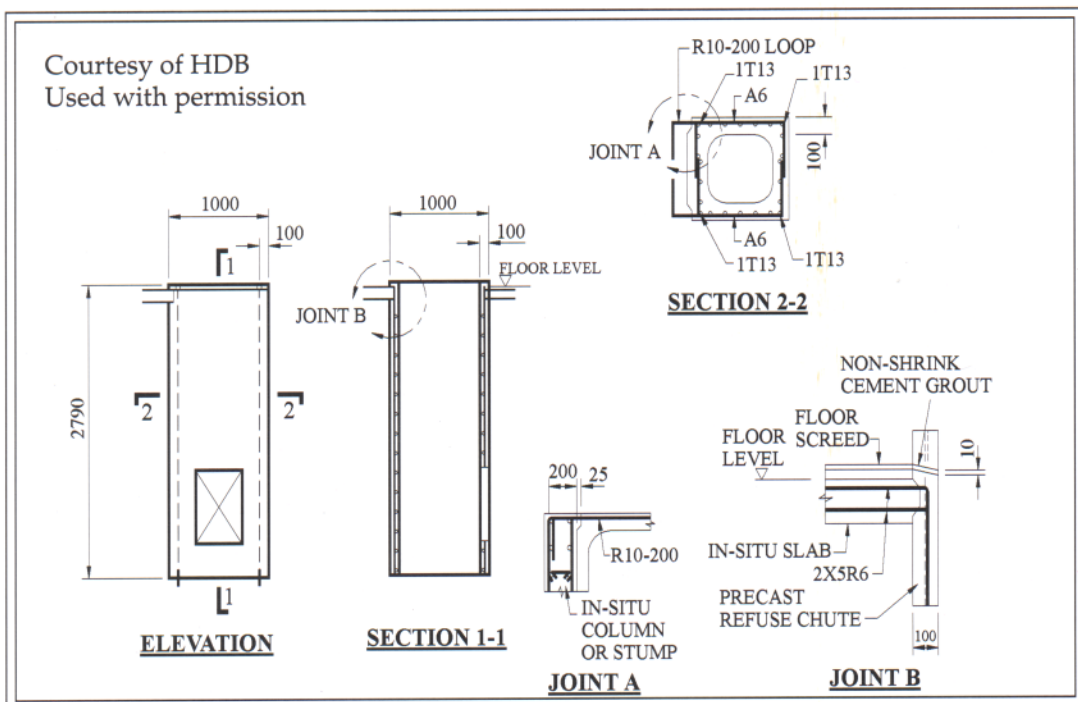
JOINT A

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Refuse Chute



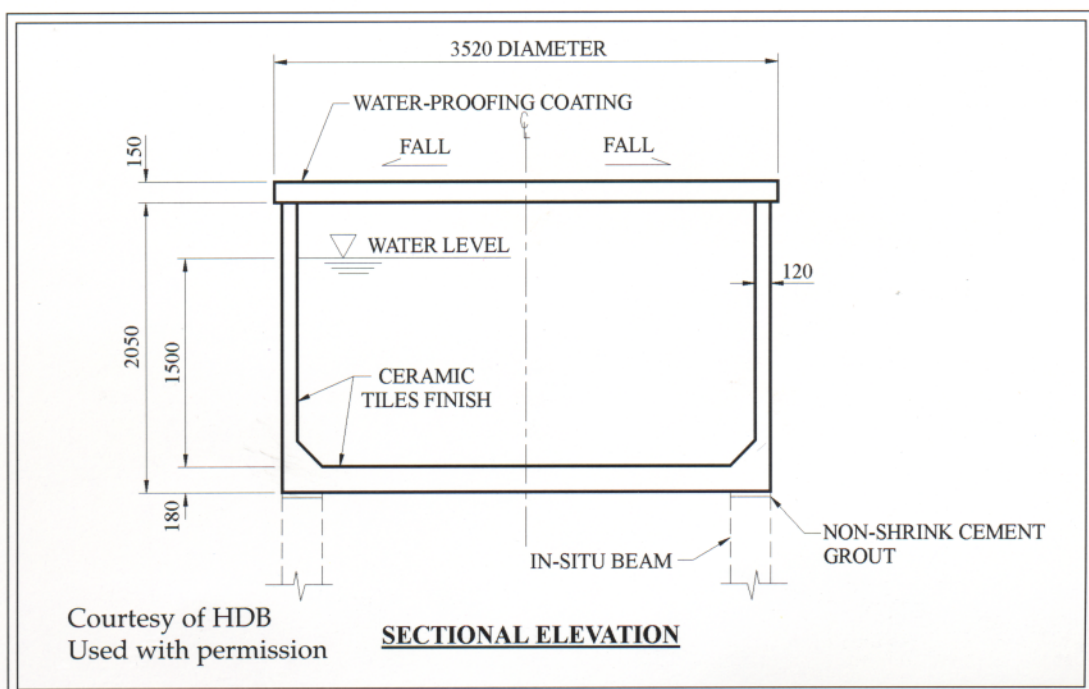
The precast refuse chute is designed as load bearing component. It offers better surface finish and is durable against corrosive refuse. It is anchored to adjacent beams, walls and slabs at each floor by its loop bars.



Water Tank

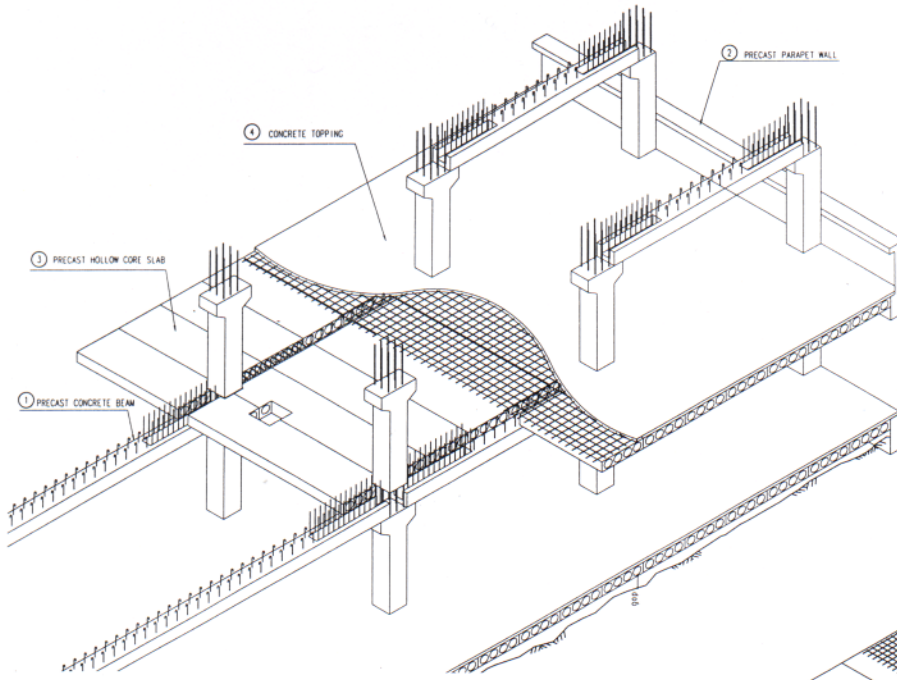


The precast water tank can be installed easily. It is cheaper and more durable than steel and fibre reinforced plastic water tank.



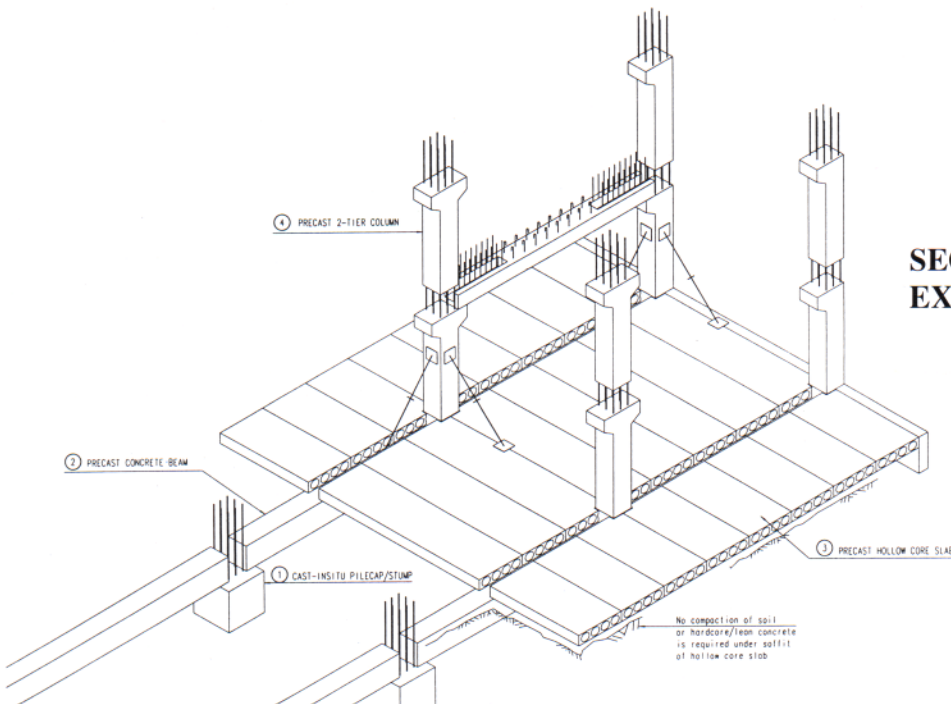
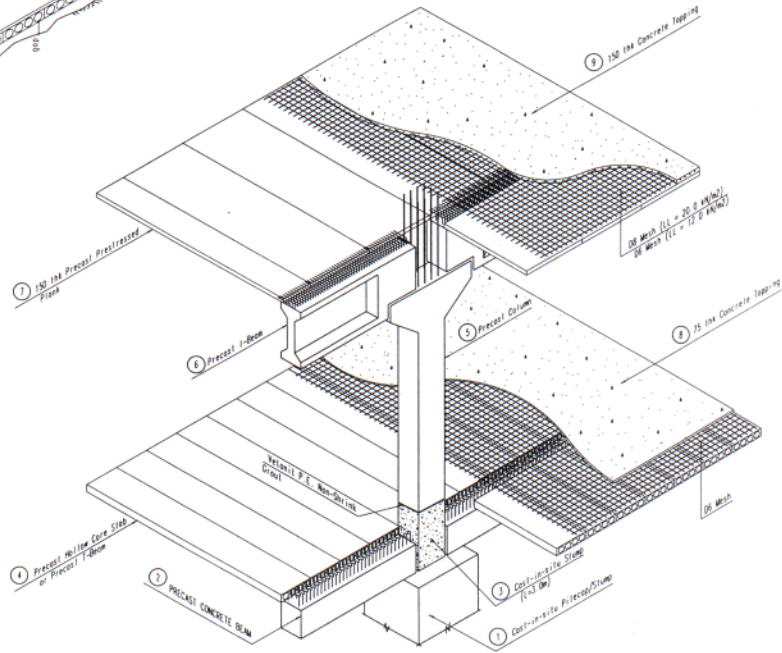
Assembly of Precast Components





**SEQUENCE OF ERECTION
EXAMPLE 1**

**SEQUENCE OF ERECTION
EXAMPLE 2**

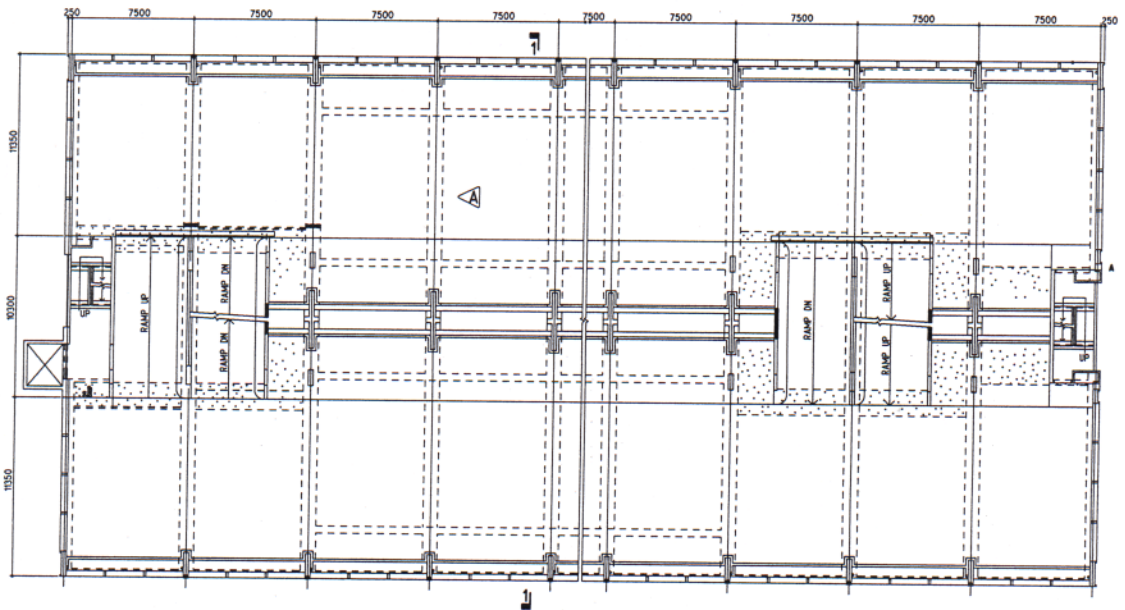


**SEQUENCE OF ERECTION
EXAMPLE 3**

Multi-storey Carpark

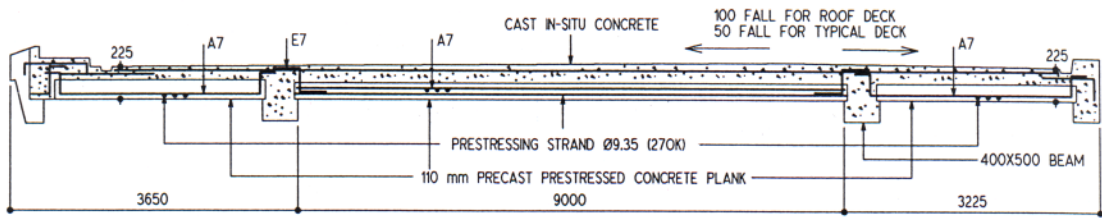


The large scale of standardisation in multi-storey carparks enables them to be constructed using prefabricated components. The precast components used range from precast slabs to vehicular crash barriers. Precast frame and skeletal systems with double-T or hollow core slabs for floor are used to obtain large open space for parking. Adoption of precast method for construction of multi-storey carparks has been proven to give a shorter construction time. The following pages show a typical precast multi-storey carpark designed by HDB.

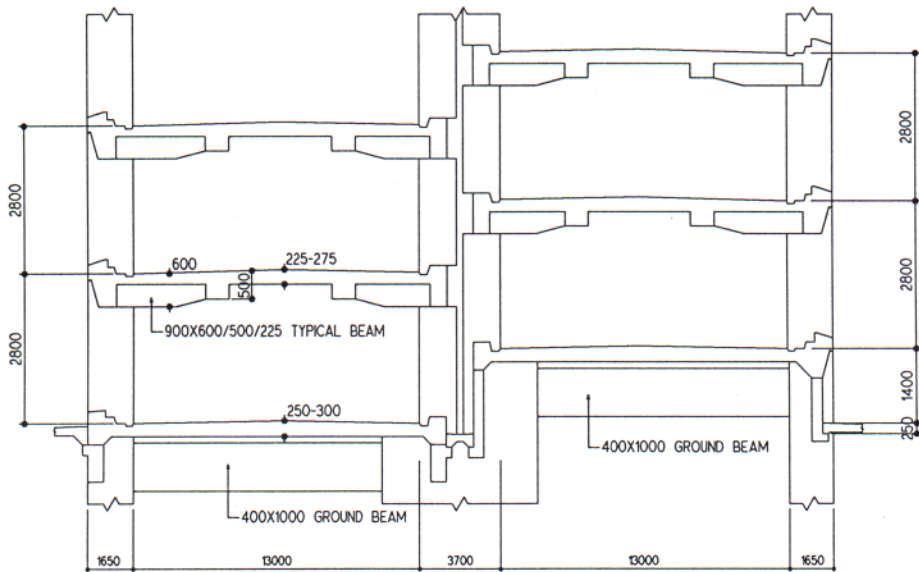


UPPER STOREY FLOOR PLAN

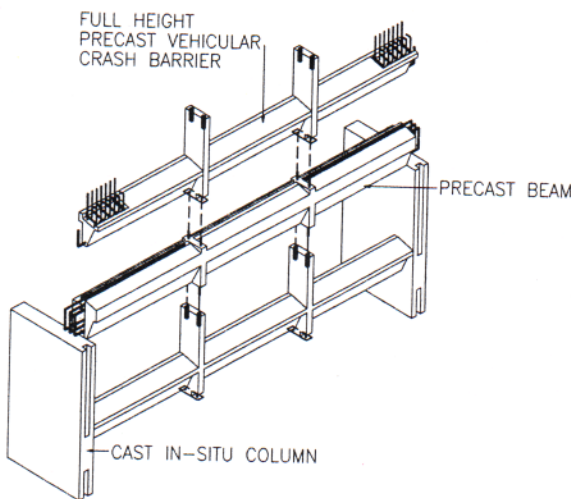
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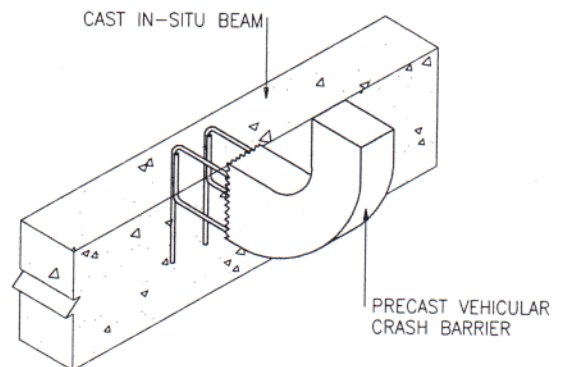
110mm THICK PRECAST PRESTRESSED CONCRETE FLOOR PLANK SECTION 1-1



STRUCTURAL FRAME VIEW A



PERIPHERAL PRECAST BEAM AND FULL HEIGHT PRECAST VEHICULAR CRASH BARRIER

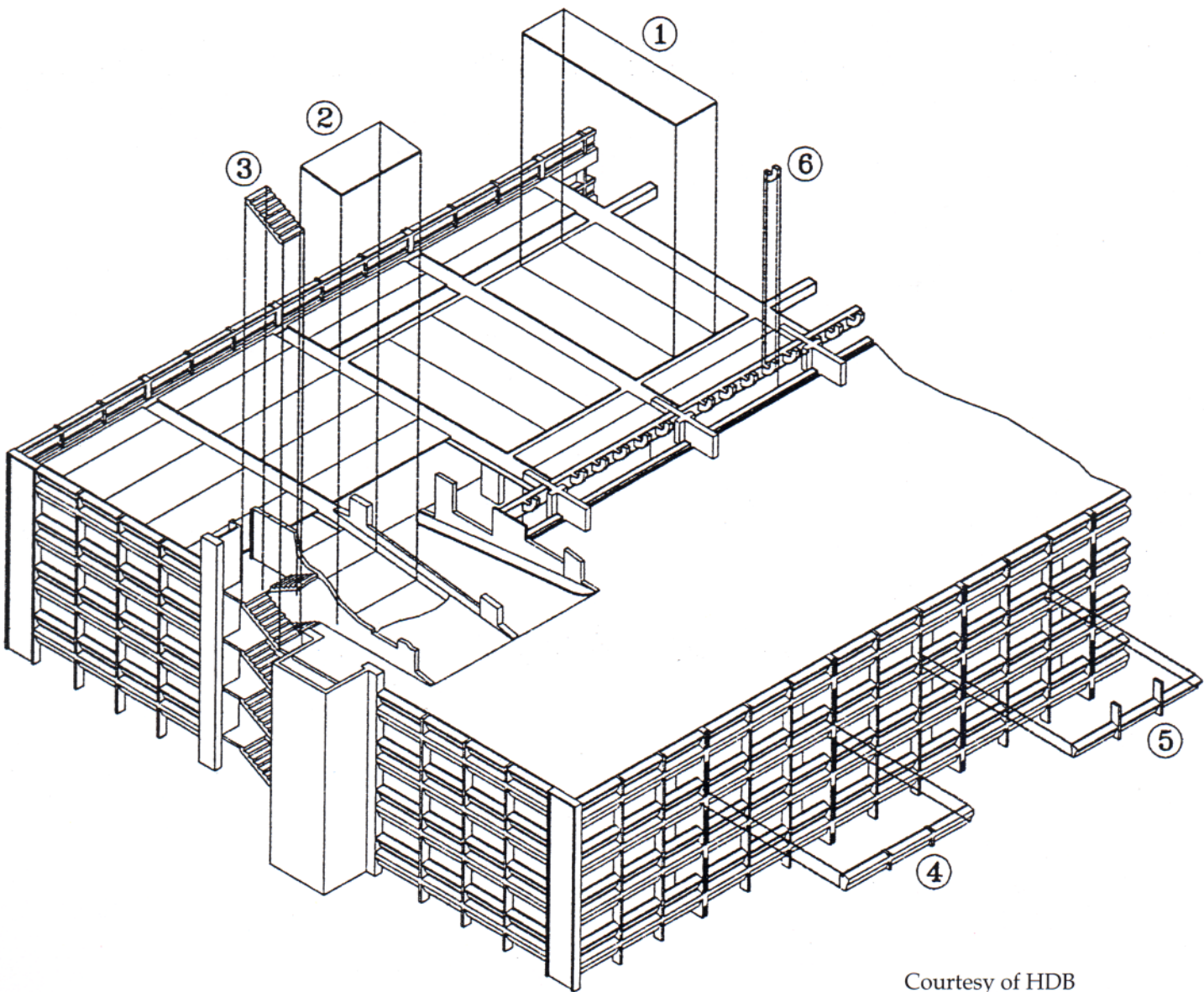


CURVED PRECAST VEHICULAR CRASH BARRIER AT ROOF DECK

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Precast Concrete Components

- ① Precast Prestressed Concrete Floor Plank For Upper Deck
- ② Precast Prestressed Concrete Floor Plank For Ramp
- ③ Precast Staircase
- ④ Peripheral Precast beam
- ⑤ Precast Vehicular Crash Barrier
- ⑥ Curved Precast Vehicular Crash Barrier At Roof Deck



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