

Page xi – Amended text highlighted in **bold**

A_{s1} = Tensile area of primary beam. This is usually the area of a singly reinforced beam with maximum steel ratio **p_{max}** for which $k_u = 0.4$.

Remove following;

~~A_{sc} = Area of reinforcement on compression side.~~

Page xii – Remove following;

~~b_w = Width of web.~~

~~d = Effective depth of beam.~~

Page xiii – Remove crossed out material and add/amend text highlighted in **bold**:

~~e_{sc} = Distance from extreme compression fibre to the centroid of the outer compression reinforcement.~~

E_c = The mean value of modulus of elasticity of concrete at nominated age.

$$= \rho^{1.5} \times 0.043 \sqrt{f_{cm}}$$

E_u = Ultimate earthquake action.

f_c = An intermediate concrete stress.

~~f_{st} = An intermediate tensile steel stress within the elastic range.~~

Page xiv – Amended text highlighted in **bold**

G^R = Dead loads resisting instability

L_{ef} = Effective span of beam, **lesser of** L and $(L_n + D)$ or $(L_n + D/2)$ for cantilevers.

L_o = Span length used in simplified method, $L - 0.7$ times the sum of **a_s** for each support.

Pages xiv and 235 – Add symbol definition k_{u0}

k_{u0} = Ratio at ultimate strength of the depth of the NA from the extreme compressive fibre to d_o . Symbols k_u is applied for k_{u0} in this text.

Page xv – Remove following;

~~L_y = Longer effective span of slab supported on four sides.~~

~~M_{ud} = The reduced ultimate strength in bending when k_u is reduced to 0.4.~~

Page xvi – Add/amend text highlighted in **bold**

p_v = Shear steel ratio **$A_{st}/(b_v d_o)$** .

S_u = Ultimate action due to combination of various actions.

Page xvii - Remove crossed out material

- add/amend text highlighted in **bold**

- replace symbols b_1, b_2, b_3 and d by **$\beta_1, \beta_2, \beta_3$** and **$\delta$**

~~V_{ue} = Ultimate punching shear strength.~~

~~w^* = Design load used for strength conditions.~~

~~w^{\ddagger} = Unit slab design load used as alternative symbol for F_d .~~

W_s = Serviceability wind action.

W_u = Ultimate wind action.

β_1 = Shear strength coefficient for comparable increase in shear capacity of shallow beams.

β_2 = Shear strength coefficient for axial load effects.

β_3 = Shear strength coefficient to account for increased strength when concentrated loads are applied near supports (short shear span $a_v < 2d_o$).

δ = Deflection obtained from calculations.

Page xviii – Replace symbols d_b, d_s, D, F and g by **$\delta_b, \delta_s, \Delta, \Phi, \gamma$** and add **$\rho$**

δ_b, δ_s = Moment magnifiers for braced and sway columns.

Δ = Maximum deflection – normally expressed as a fraction, eg Δ/L .

Φ or ϕ = Strength reduction factor.

γ = Ratio of depth of simplified rectangular stress block to depth of NA.

ρ = density of concrete (taken as 2400 kg/m³ in this book)

Page 1 - Add the following symbols:

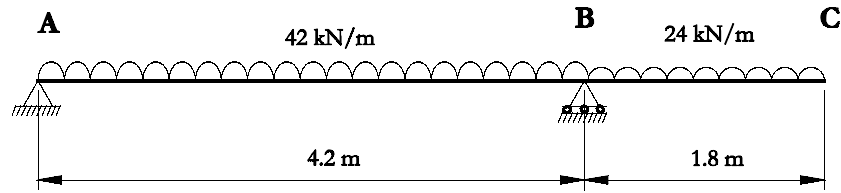
E_u = Ultimate strength action.

S_u = Ultimate action due to combination of various actions.

W_s = Serviceability wind action.

W_u = Ultimate wind action.

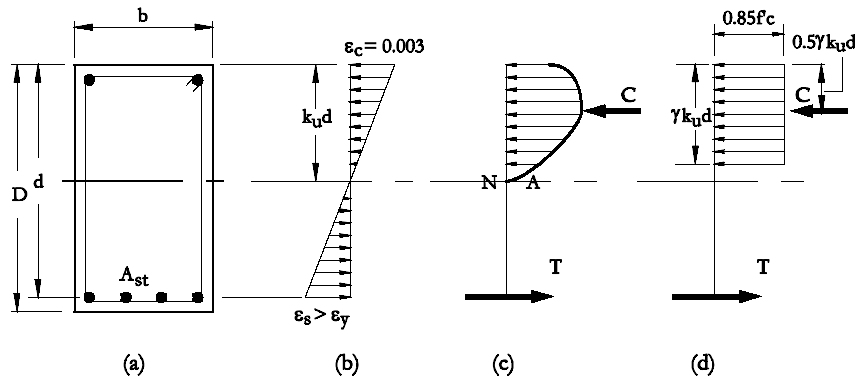
Page 10 Figure 1.5 – Replace 43 kN/m UDL by 42 kN/m and 25kN/m UDL with 24kN/m



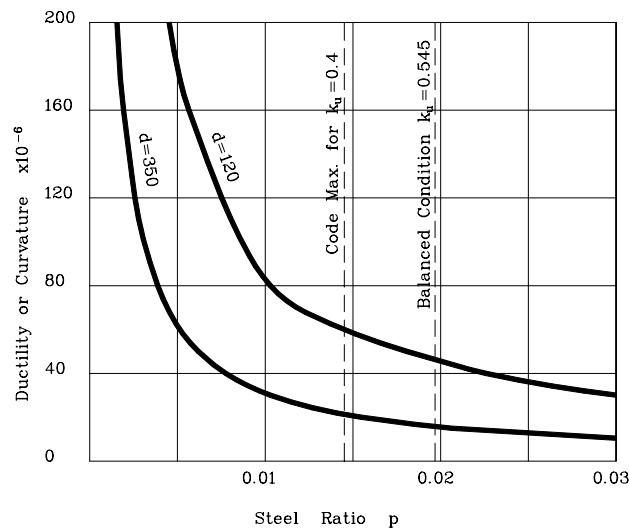
Page 17 – Amended text highlighted in **bold**

(b) Strain is linear i.e. it is directly proportional to the distance from the NA for all moments up to and including the ultimate bending moment **M_{uo}** .

Page 18 Figure 2.4 alter dimension $\gamma k_u d$ and identify figures (a), (b), (c) and (d)



Page 23 – Replace Figure 2.7 with following



Page 25 and Page 285 Table 2.4 Replace symbol † with ≥

(d) Bending with axial compression where:

$$(i) N_u \geq N_{ub}$$

Page 26 – Altered value shown highlighted in **bold**

$$p_{\max} = 0.34\gamma \frac{f'_c}{f_{sy}} = 0.34 \times \mathbf{0.85} \times \frac{25}{500} = \mathbf{0.0145}$$

Page 28 – Add **bd²** to equation as shown **bold**

$$\Phi M_{uo} = \Phi f'_c z \left(1 - \frac{z}{1.7} \right) \mathbf{bd^2}$$

Page 32 – Table 3.1, altered classification shown highlighted in **bold**

(c) Coastal (up to 1 km from coastline but excluding tidal and splash zones) and any climatic zone.

B2

Page 34 – Table 3.3, heading, alteration shown highlighted in **bold**

Required Cover in mm
Characteristic Strength **f_c'**

Page 36 – Altered symbols shown highlighted in **bold**

$$\frac{A_{\mathbf{st}}}{bd} \geq 0.22 \left(\frac{D}{d} \right)^2 \frac{\mathbf{f_{cf}'}}{\mathbf{f_{sy}'}}$$

Page 41 – Altered data shown highlighted in **bold**

Required total depth of beam, D = **477 + 66 = 543** mm.

.

The trial section is satisfactory. If the actual weight of beam is used, the design moment, M* = **300.2** kNm

Page 45 Equation 4.3 – Corrected equation reads,

$$\lambda = \Phi p f_{sy} \left(1 - \frac{p f_{sy}}{1.7 f'_c} \right)$$

Page 56 – Remove crossed out text and add new formula

If $\epsilon_{sc} \geq \mathbf{0.0025}$ then the compressive reinforcement **HAS** yielded and the required area of compressive reinforcement ~~is equal to the tensile area~~ is given by;

$$A_{sc} = A_{s2}$$

$$A_{sc} = \frac{A_{s2} f_{sy}}{f_{sy} - 0.85 f'_c}$$

Page 57 – Modify equation for p_1 (modification shown in **bold**) when $\epsilon_{sc} \geq 0.0025$

$$p_1 = \frac{A_{st} - A_{sc} \left[\frac{f_{sy} - 0.85 f'_c}{f_{sy}} \right]}{bd} \quad \text{If } \epsilon_{sc} \geq 0.0025$$

Page 60 – Equation 5.11, add Φ to denominator

$$A_{sc} = \frac{M_2}{\Phi (f_{sc} - 0.85 f'_c) (d - d_{sc})} \quad \mathbf{5.11}$$

Page 61 Table 5.1 – Replace data for 65MPa concrete grade shown in **bold**

Parameter	f'_c in MPa					
	20	25	32	40	50	65
γ	0.850	0.850	0.822	0.766	0.696	0.65
p_{max}	.0116	0.0145	0.0179	0.0208	0.0237	0.0287
z	0.2890	0.2890	0.2795	0.2604	0.2366	0.221
λ	3.838	4.797	5.979	7.057	8.147	9.998

Page 62 – Altered data shown in **bold**

$$d_{sc} = 64\text{mm}$$

$$d = 500 - \mathbf{68} = \mathbf{432}\text{mm}$$

Area of tensile reinforcement in primary beam,

$$A_{s1} = 0.0179 \times 350 \times \mathbf{432}$$

$$= \mathbf{2706} \text{ mm}^2$$

$$M_1 = \lambda b d^2$$

$$= 5.979 \times 350 \times \mathbf{432}^2 \times 10^{-6}$$

$$= \mathbf{390.5} \text{ kNm}$$

$$M_2 = M^* - M_1$$

$$= 465 - \mathbf{390.5}$$

$$= \mathbf{74.5} \text{ kNm}$$

Area of tensile reinforcement required,

$$A_{s2} = \frac{M_2}{\Phi f_{sy}(d - d_{sc})} = \frac{74.5 \times 10^6}{0.8 \times 500(432 - 64)} = 506 \text{ mm}^2$$

$$\frac{d_{sc}}{d} = \frac{64}{432} = 0.148$$

Page 63 – Altered data shown in **bold**

From chart B2 read $K = 1.42$

Area of compressive reinforcement required,

$$\begin{aligned} A_{sc} &= K \times A_{s2} \\ &= 1.42 \times 506 \\ &= 719 \text{ mm}^2 \end{aligned}$$

Total tensile area required,

$$\begin{aligned} A_{st} &= A_{s1} + A_{s2} \\ &= 2706 + 506 \\ &= 3212 \text{ mm}^2 \end{aligned}$$

·
·
·

Total tensile area required,

$$A_{st} = 2556 + 848 = 3404 \text{ mm}^2$$

Page 64 – Correct text shown in **bold** and in Figure 5.3 replace 9N24 by 8N24 bars

For tensile reinforcement, choose **8N24** bars in two rows as shown below giving, $A_{st} = 3600 \text{ mm}^2$.

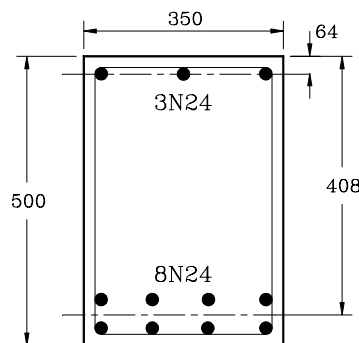


Figure 5.3

Page 68 – Altered data shown in **bold**

From chart DRCB-32 for $d_{sc}/d = 0.125$ and $\Phi M_{uo}/(bd^2) = 9.29 \text{ MPa}$ read the required steel ratios $p_t = 0.0276$ and $p_c = 0.0126$. Figure 5.5 shows the construction lines required to read the chart.

$$\begin{aligned} \text{Required areas of reinforcement } A_{st} &= 0.0276 \times 350 \times 400 \\ &= 3864 \text{ mm}^2 \end{aligned}$$

$$A_{sc} = \mathbf{0.0126} \times 350 \times 400 = \mathbf{1764} \text{ mm}^2$$

6N28 bars in two rows of three bars gives $A_{st} = \mathbf{3720} \text{ mm}^2$ and **4N24** bars gives $A_{sc} = \mathbf{1800} \text{ mm}^2$. From Table 3.4 adjusted dimensions for exposure A2 are $d = \mathbf{419} \text{ mm}$ and $d_{sc} = \mathbf{49} \text{ mm}$. Repeating the procedure using new values of d and d_{sc} .

Page 69 – Altered data shown in **bold**

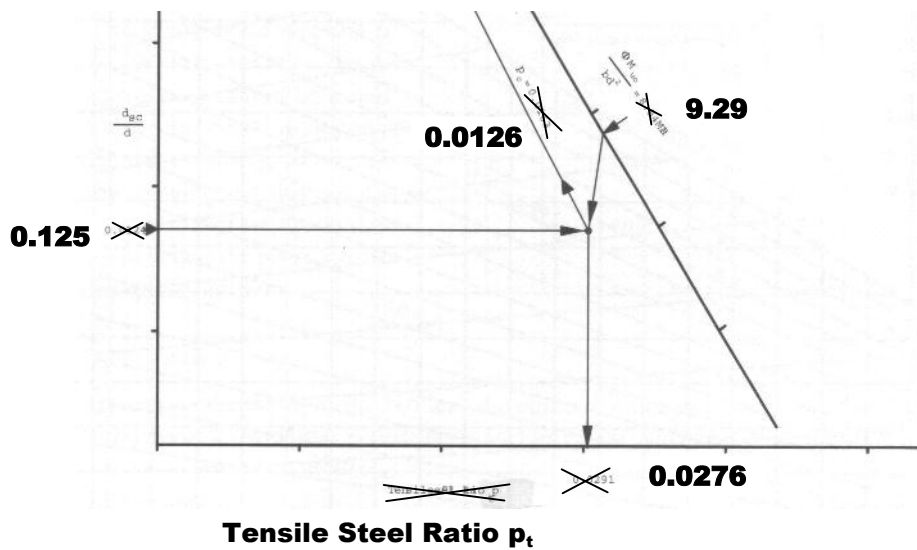
$$d_{sc} / d = \mathbf{49/419} = \mathbf{0.117}$$

$$\Phi M_{uo} / bd^2 = \mathbf{8.46} \text{ MPa}$$

Chart DR**C**B-32 read $p_t = \mathbf{0.0250}$, $p_c = \mathbf{0.009}$

$$\text{Re quired } A_{st} = \mathbf{0.0250} \times 350 \times \mathbf{419} = \mathbf{3666}$$

$$\text{Re quired } A_{sc} = \mathbf{0.009} \times 350 \times \mathbf{419} = \mathbf{1320}$$



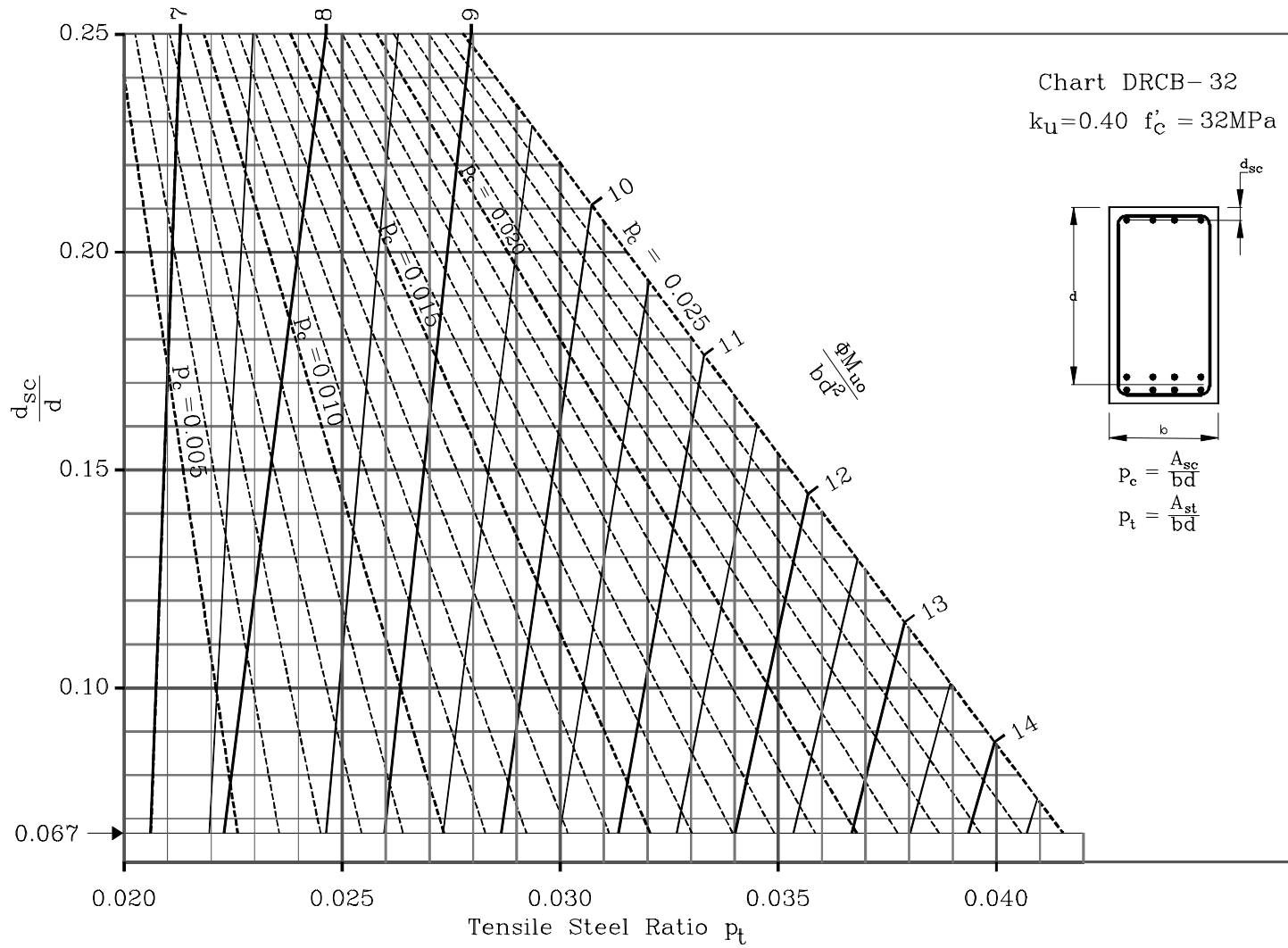
Choose **6N28 bars** giving $A_{st} = \mathbf{3720} \text{ mm}^2$, and **3N24 bars** giving $A_{sc} = \mathbf{1350} \text{ mm}^2$

Check primary beam steel ratio.

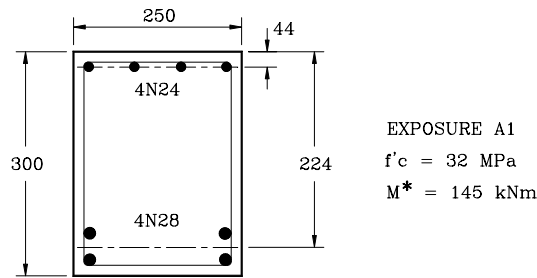
$$p_t = \left(\frac{\mathbf{3720} - \mathbf{1350}}{350 \times \mathbf{419}} \right)$$

$$= \mathbf{0.0162} < p_{\max} (= 0.0179)$$

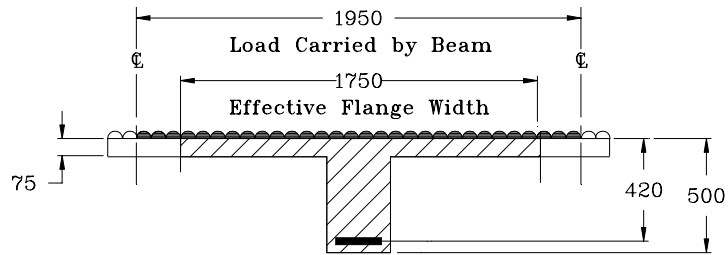
Page 70 – Replace Chart DRCB – 32 with following



Page 71 Question 2 – Adjust effective depth dimension to centroid of reo.



Page 77 Figure 6.5 – Amend figure



Page 82 – Amendment shown in **bold**

From Table 3.4 choose 6N36 placed in two rows of **3** bars whose area $A_{st} = 6120 \text{ mm}^2$.

Page 83 – Amended text shown **bold** and replace chart T-18A

Example 3.

Determine the area of reinforcement for the beam shown in Figure 6.8.

Solution

Data: $b = 150$ $b_w = 350$ $d = 540$ $t = 100$ $f'_c = 25 \text{ MPa}$ $M^* = \mathbf{175} \text{ kNm}$

$$\frac{M^*}{bd^2} = \frac{\mathbf{175} \times 10^6}{\mathbf{150} \times 540^2} = \mathbf{4.0} \text{ MPa}$$

$$\frac{t}{d} = \frac{100}{540} = 0.185 \quad \frac{b}{b_w} = \frac{150}{350} = 0.43$$

Using chart T-18A for $t/d = 0.18$, read the required steel ratio $p = \mathbf{0.0114}$ for $\Phi M_{uo}/(bd^2) = \mathbf{4.00}$ MPa and $b/b_w = 0.43$.

Using the smaller value of t/d , the steel ratio read from T-18A will be slightly conservative, a more accurate value can be obtained by interpolating between the results obtained from charts T-18 and T-20 although the difference may not be discernable.

Hence the required tensile area,

$$A_{st} = \mathbf{0.0114} \times 150 \times 540$$

$$= \mathbf{923} \text{ mm}^2$$

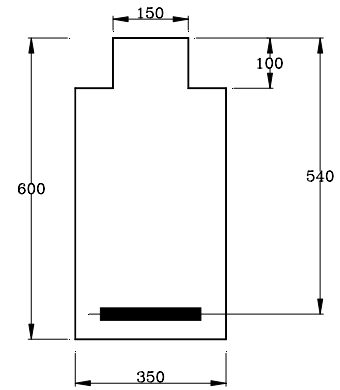
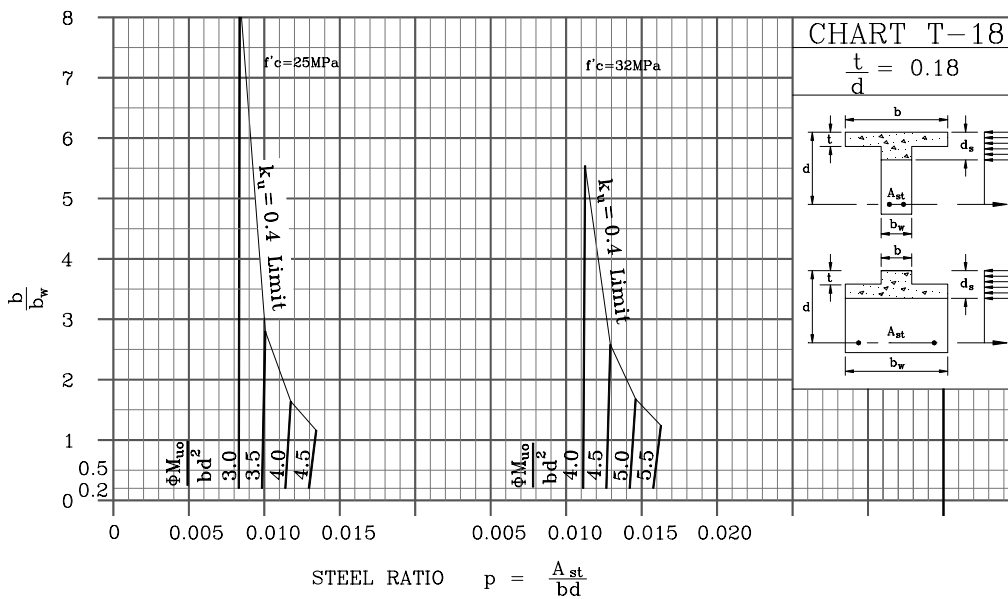


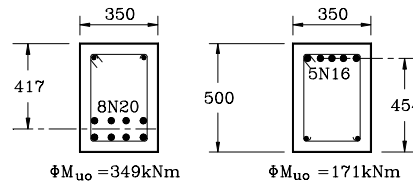
Figure 6.8



Page 95 Example 2 – Add text shown in **bold**

- Alter effective depth dimensions in Figure 7.7

shown in the figure. Grade **N32** concrete is used for the beam ~~which is in an Exposure Classification A1~~. The bending

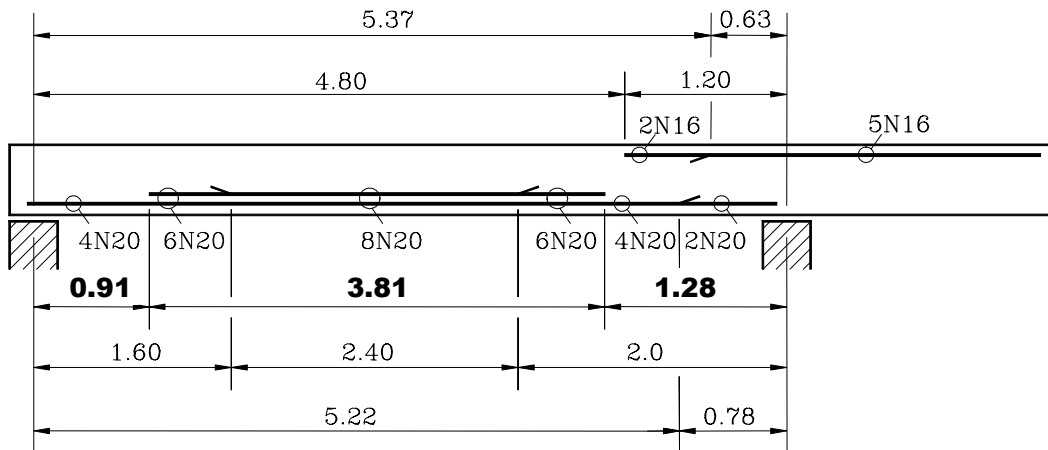


Page 96 – Example 2 - Correction shown in **bold**

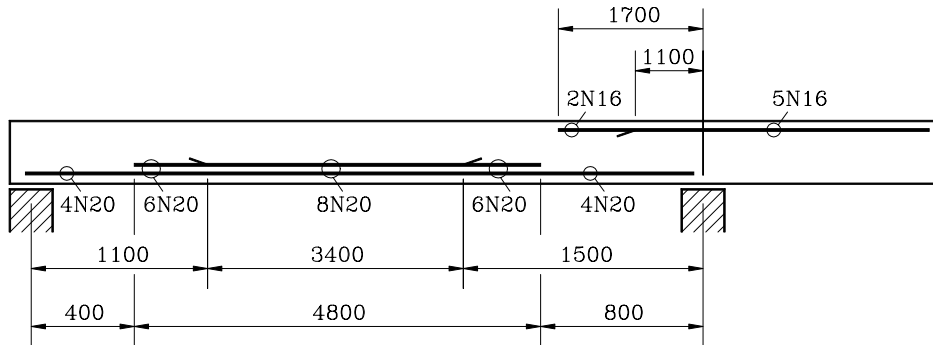
$$x = \frac{228 \pm \sqrt{228^2 - 2 \times 174.5 \times 81}}{81}$$

$$= \mathbf{0.91} \text{ m and } \mathbf{4.72} \text{ m}$$

Page 97 Figure 7.9 – Corrected dimensions shown in **bold**



Page 98 Figure 7.10 – Amended figure shown below



Page 98 – Amended values shown in **bold**

It now only remains to check that development lengths have been provided. The concrete cover for Exposure Condition A1 is 20mm. Since at this stage using 12mm stirrups is 38mm for the negative reinforcement and 47mm for the positive reinforcement. ~~are assumed,~~ **Assuming 20mm minimum cover,** the actual concrete side cover for the longitudinal reinforcement is 32mm.

$$\text{Clear spacing} = \frac{350 - 2 \times 32 - 4 \times 20}{3} = 68\text{mm} < \mathbf{94} \text{ (Twice the cover)}$$

Assume N32 spacer bars between each row of positive reinforcement, the clear spacing between bars is 32 mm which is less than the horizontal spacing of 68 mm and less than twice the cover of **94** mm. The development length will therefore be calculated for $a = 32/2 = 16$ mm. From Table 7.1 $L_{syt} = \mathbf{1180}$ mm by interpolation ...

Similarly the clear spacing between the negative reinforcing bars is calculated to be $(350 - 2 \times 32 - 5 \times 1.5)$ mm. This is less than twice the **38** mm cover. The required development length for N16 negative reinforcement is obtained from Table 7.1 for $a = 51.5/2 = 26$ mm.

$$L_{syt} = \mathbf{576} \text{ mm}$$

The negative reinforcing bars are top bars with more than 300mm of concrete cast below the bars. The development length must therefore be increased by factor k_1 .

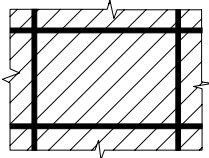
$$L_{sy,t} = 1.25 \times \mathbf{576} = \mathbf{720} \text{ mm, say } 710 \text{ mm}$$

Page 99 Question 1 – Change Grade N32 concrete to Grade **N40**

Page 103 Note 3. – Change D/L_{ef} to read Δ/L_{ef}

Page 105 Line 7 – Change “then” to “than”

Page 105 Table 8.2 Edge Condition 1 should read as follows:

1. Four edges continuous		4.00	3.40	3.10	2.75
--------------------------	---	------	------	------	------

Page 107 – Amendment shown in **bold**

$$k_{cs} = 2 - 1.2 \frac{620}{2480} = 1.7 \qquad E_c = \mathbf{34500} \text{ MPa}$$

Page 113 – Corrections shown in **bold**

STEP 1

To determine $A_{st,min}$ we first have to calculate A_{ct} . If we ignore the presence of the Reinforcement then **A_{ct}** for rectangular section

STEPS 2 & 3

$$A_{st,min} = \frac{\mathbf{3k_s} A_{ct}}{\mathbf{f_s}}$$

.
.
.

STEP 5

To calculate the tensile stress in the reinforcement at a cracked section under short term Serviceability loads f_{scr} we must calculate the design bending moment at the serviceability

Limit state **M_s^*** the neutral axis depth kd and the **I_{cr}** .

$$f_{scr} = \frac{n \mathbf{M_s^*} (d - kd)}{I_{cr}}$$

Page 116 and 311 – On Chart D2 change D/L_{ef} to Δ/L_{ef} along top of chart

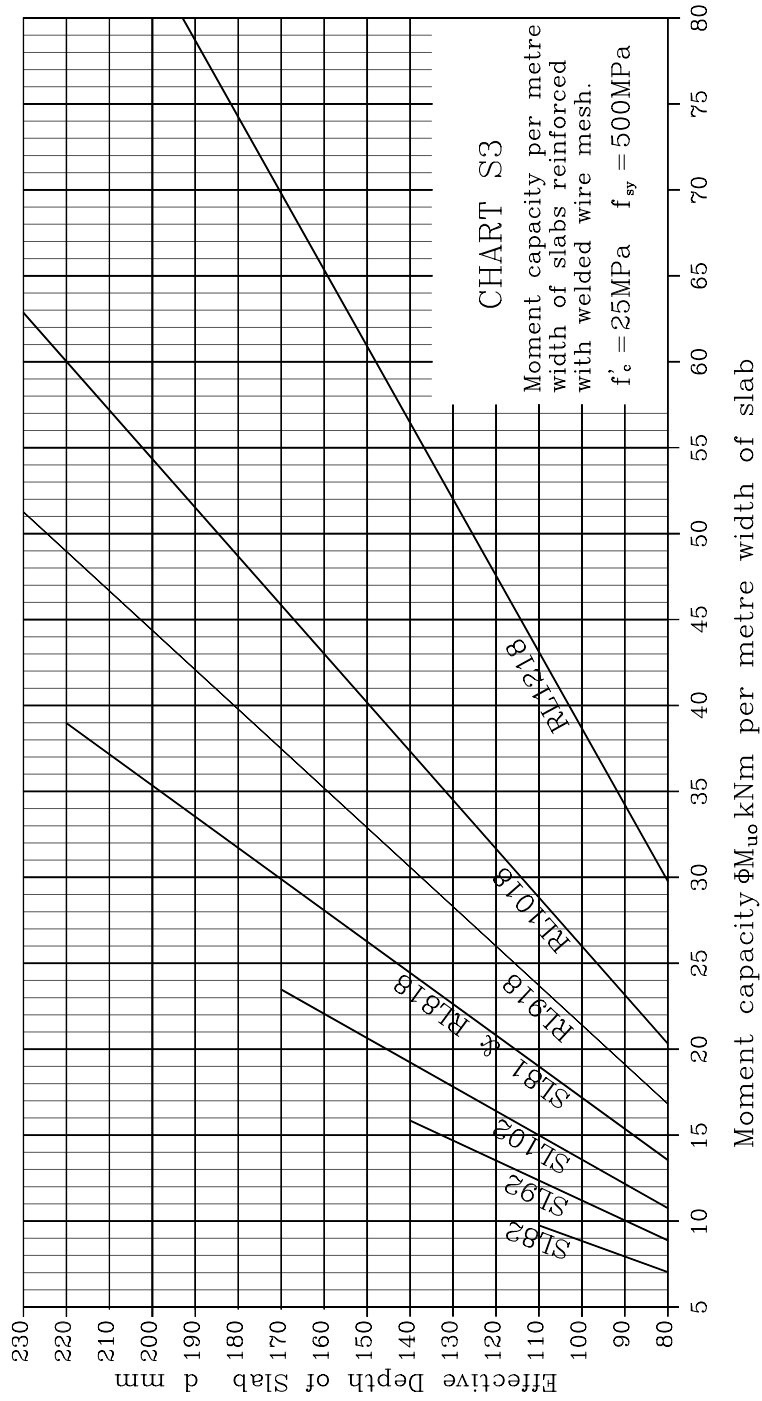
Page 118 Correction shown in **bold**

From Table **3.3**, minimum

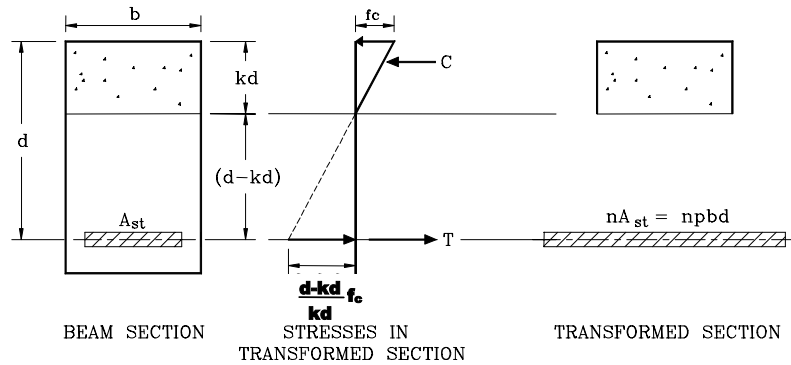
Pages 123 and 314 - Replace chart S3 with chart on following page

OR

simply plot line for RL918 mesh from 16.8 kNm for d=80mm to 51.3 kNm for d-230mm on existing chart.



Page 130 Figure 8.8 – Change stress at level of reinforcement shown in **bold**



Page 131 Equation 8.12 – Corrections shown in **bold**

$$I_{cr} = b \frac{(kd)^3}{3} + nA_{sc} (d - kd)^2 + (n - 1)A_{sc} (kd - \mathbf{d}_{sc})$$

Page 137 Replace ϵ_s by ϵ_{cs}

From AS3600 for a 30 year life and $t_h = 195$ mm, the new ϵ_{cs} will be 670 microstrain

Page 139 – Corrections shown in **bold**

$$A_{sc} = 1600\text{mm}^2$$

⋮

$$f_{cs(dr)} = f_{cs(sr)} - (A_{sc}/A_{st})f_{cs(sr)} \dots \text{but } \geq f_{cs(sr)} \text{ (suggested minimum)}$$

= 0.58 MPa	= 0.51 MPa
(doubly reinf)	(doubly reinf)

Where $f_{cs(sr)} = [1.5p/(1 + 50p)]E_c\epsilon_{cs}$ = 1.74 MPa = 1.52 MPa

Page 151 – Correction shown in **bold**

DESIGN STRENGTH FOR A **1m** WIDE STRIP

Page 154 – Alter symbols b_1, b_2 and b_3 to β_1, β_2 and β_3 .

Page 159 Section 10.5 - Altered symbol shown in **bold**

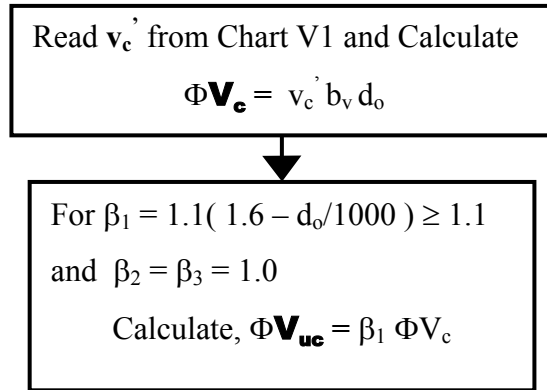
Shear near a support can be taken at a distance \mathbf{d}_o from the face of the support provided

Page 162 Section 10.8 – Altered text shown in **bold**

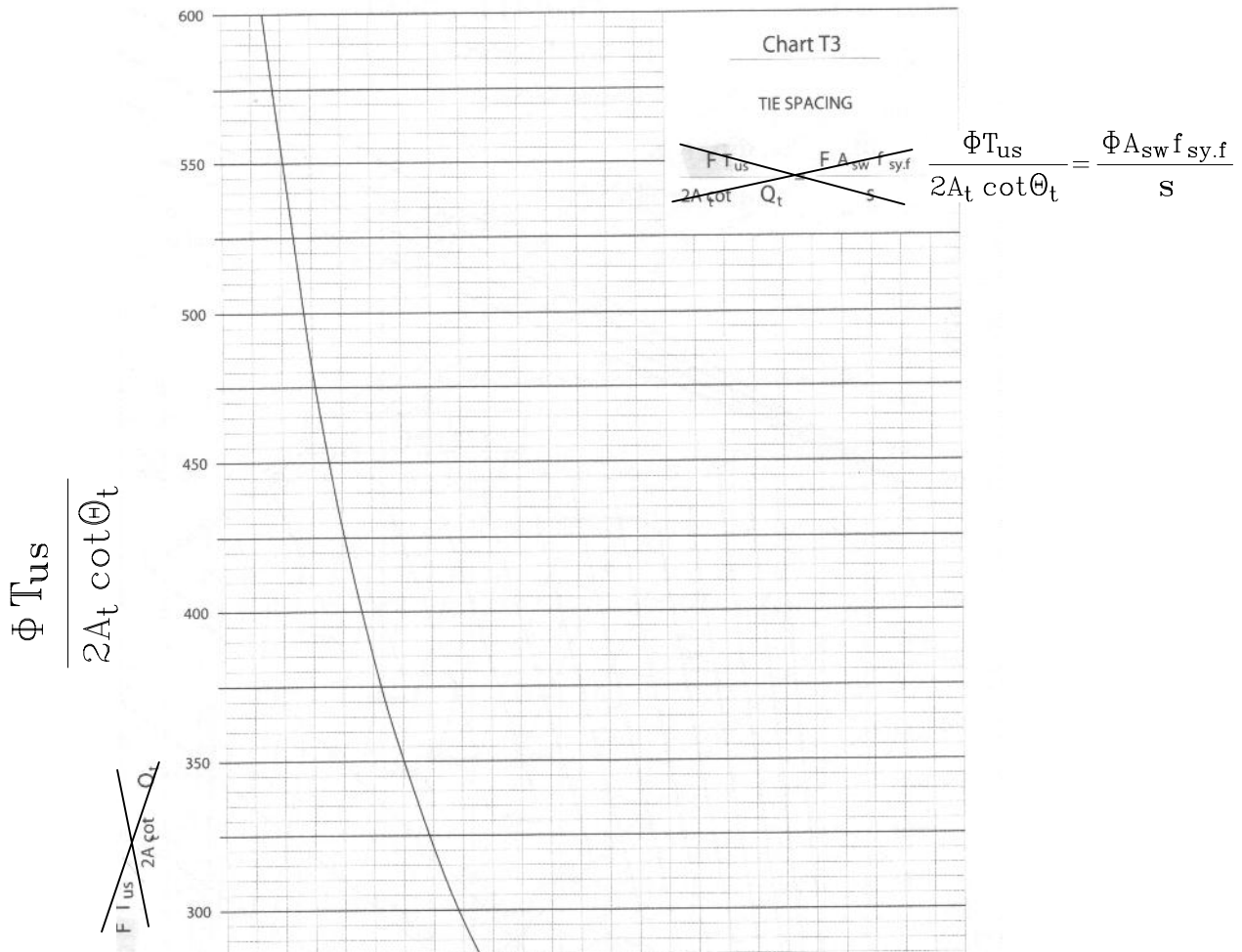
$$V_{us} = \left(\frac{\mathbf{A}_{sv} f_{sy} f d_o}{s} \right) \text{Cot}(\theta_v)$$

substituting $A_{sv.min} = \left(\frac{0.35 b_v s}{f_{sy.f}} \right)$ and

Page 163 Flow Chart – Change ΦV_c and ΦV_{uc} shown in **bold**



Page 174 Alter Text in Chart Heading and Vertical Axis Format



Page 179 – Replace \leq with \leq

$$= 0.0027s + 0.0024s \leq 1.0$$

Page 189 - Correction shown in **bold**

$$\text{Data: } f'_c = 32 \text{ MPa} \quad f_{sy} = \mathbf{500} \text{ MPa} \quad g = 1 \text{ kPa} \quad q = 4 \text{ kPa}$$

Page 190 - Correction shown in **bold**

$$\text{Required effective depth, } d = \frac{4400}{\mathbf{51.4}} = \mathbf{85.6} \text{ mm}$$

Page 216 – Correction shown in **bold**

Unknowns B_1 and B_2 . Substituting for $(\mathbf{B}_1 + B_2)$ and B_2 in equation (a) and solving for

Page 217 – Correction shown in **bold**

Or cantilever footings as shown in Figure 12.1(**d**) and Figure 12.9. The philosophy is

Page 222 Figure 12.14 – Change to lower case **u** after SHEAR PERIMETER

Page 231 Figure 12.20 – Change 8Y28 to **8N28**

Page 233 Question 3 Correction shown in **bold**

The factored soil bearing capacity $q_u = 400 \text{ kPa}$.

Pages 234 and 326 Chart FP – Horizontal axis symbol shown in **bold**

Punching Shear Capacity $\Phi \mathbf{V}_u$ kN

Pages 239 – Replace symbol e by ϵ in line,

Rewriting the general axial load equation in terms of the combined strain ϵ ,

Page 244 – Corrections shown in **bold**

(given by equation **13.3**) would need to be applied to cause simultaneous uniform

Page 247 Figure 13.11 – Corrections shown in **bold**

Replace N_{uo} by \mathbf{N}_u

Replace $d - 0.5 \gamma k d_u$ by $\mathbf{d - 0.5 \gamma k_u d}$

Page 248 Fourth equation – Equation to read as follows:

$$f_{st} = 2 \times 10^5 \epsilon_{st} \leq f_{sy}$$

Page 249 - Line 6 replace 13.1 by **13.3** Line 27 replace 1161×10^6 by **1.161×10^6**

Page 253 – Amend text shown in **bold**

$$N_u e' = 1228.2 \times (425 - 0.5 \times \mathbf{0.85} \times 170) + 778.8 \times (425 - 75)$$

$$= \mathbf{705850} \text{ kNmm}$$

$$e' = \frac{\mathbf{705850}}{767} = \mathbf{920} \text{ mm}$$

$$e = \mathbf{920} - 175 = \mathbf{745} \text{ mm}$$

$$M_u = 767 \times \mathbf{745} \times 10^{-3}$$

$$= \mathbf{571} \text{ kNm}$$

⋮

$$\Phi = \dots\dots\dots$$

$$= 0.6 + 0.2 \times \left(1 - \frac{767}{1388} \right) = 0.69$$

⋮

$$\Phi M_u = 0.69 \times \mathbf{571} = \mathbf{394} \text{ kNm}$$

Page 254 – Amend text shown in **bold**

$$N_{ub} e' = \dots\dots\dots$$

$$= 181810 \text{ kNmm}$$

Page 255 - In line 2 replace 13.2 by **13.4**

Page 256 – Amend text shown in **bold**

$$N_u e' = 837.1 \times (425 - 0.5 \times \mathbf{0.822} \times 93.6) + 451.7 \times (180 - 60)$$

$$= \mathbf{172679} \text{ kNmm}$$

$$e' = \frac{\mathbf{172679}}{88.8} = \mathbf{1945} \text{ mm}$$

$$e = \mathbf{1945} - 60 = \mathbf{1885} \text{ mm}$$

$$M_u = 88.8 \times \mathbf{1885} \times 10^{-3}$$

$$= \mathbf{167.4} \text{ kNm}$$

⋮

$$\Phi M_u = 0.6 \times \mathbf{167.4} = \mathbf{100.4} \text{ kNm}$$

Page 257 - In line 12, line 18 and line 25, replace 13.2 by **13.4**

Page 258 - Amendments shown **bold**

$$\begin{aligned}\Phi N_u \times e' &= 1075.3 \times (390 - 5 \times 0.85 \times 283.5) + 650.5 \times (390 - 60) \\ &= \mathbf{504472} \text{ kNm}\end{aligned}$$

$$e = \frac{\mathbf{504472}}{1401.4} - 165 = 195 \text{ mm}$$

Page 258 - Section 13.10 line 2, replace 13.2 by **13.4**

Page 263 Equation 13.17 - Replace $200d_o$ by **$182d_o$**

Page 264 - Line 1 and subsequent Equation 13.19 - Replace $200d_o$ by **$182d_o$**

- Example 7 changed dead and live loads shown **bold**

The column is required to carry an axial design load $N^* = 1855 \text{ kN}$ made up of **507** kN dead load G and **831** kN live

Page 266 Calculations for N_c/bD – Corrected data is highlighted in **bold**

$$\begin{aligned}\frac{N_c}{bD} &= \left(\frac{\pi}{L_e} \right)^2 D \left(\frac{\mathbf{182} d_o \frac{\Phi M_{ub}}{bD^2}}{1 + \beta_d} \right) \\ &= \left(\frac{\pi}{5270} \right)^2 400 \left(\frac{\mathbf{182} \times 340 \times 4.5}{1 + 0.379} \right) \\ &= \mathbf{28.7} \text{ MPa}\end{aligned}$$

Page 267 - Altered data is highlighted in **bold**

$$\delta_b = \frac{k_m}{1 - \frac{N^*}{N_c}} = \frac{0.685}{1 - \frac{13.25}{\mathbf{28.7}}} = \mathbf{1.28}$$

Magnified bending stress $\delta_b \frac{M^*}{bD^2} = \mathbf{1.28} \times 3.1 = \mathbf{3.97} \text{ MPa}$

Using the magnified bending stress, from chart CR2f32-7, read new steel ratio $p = \mathbf{0.035}$. This initial value may be accepted and it will be a conservative estimate of the required steel ratio. The more accurate result will be obtained by repeating the design steps using the new steel ratio until the same magnification factor and steel ratio obtained in two consecutive iterations. Repeating the procedure with the new steel ratio of **0.035**,

For $p = \mathbf{0.035}$, $\frac{\Phi N_{uo}}{bD} = \mathbf{25.8} \text{ MPa}$ and $\frac{\Phi M_{ub}}{bD^2} = \mathbf{5.4} \text{ MPa}$

$$\frac{N_c}{bD} = \left(\frac{\pi}{5270} \right)^2 400 \left(\frac{\mathbf{182} \times 340 \times \mathbf{5.4}}{1 + 0.379} \right)$$

$$= \mathbf{34.4} \text{ MPa}$$

$$\delta_b = \frac{0.685}{1 - \frac{13.25}{\mathbf{34.4}}} = \mathbf{1.11}$$

Magnified stress $\delta_b \frac{M^*}{bD^2} = \mathbf{1.11} \times \mathbf{3.1} = \mathbf{3.4}$ MPa

Further iterations will converge on $\delta_b = \mathbf{1.16}$ with a magnified stress,

$\delta_b \frac{M^*}{bD^2} = \mathbf{1.16} \times 3.1 = \mathbf{3.6}$ MPa and a required steel ratio $p = \mathbf{0.032}$. The required area of reinforcement,

$$A_s = \mathbf{0.032} \times 350 \times 400 = \mathbf{4480} \text{ mm}^2$$

Pages 268 Example 8 - Amendments shown highlighted in **bold**

Check the column in example **7** for biaxial bending when the minimum design moment is applied about the weak axis.

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$$\frac{\Phi M_{ux}}{bD^2} = \mathbf{3.9} \text{ MPa}$$

$$\frac{\Phi M_{ubx}}{bD^2} = \mathbf{5.3} \text{ MPa}$$

Pages 269 - Amendments shown highlighted in **bold**

$$\frac{N_c}{bD} = \left(\frac{\pi}{5270} \right)^2 400 \left(\frac{\mathbf{182} \times 340 \times \mathbf{5.3}}{1 + 0.379} \right) = \mathbf{33.8} \text{ MPa}$$

$$\delta_b = \frac{0.685}{1 - \frac{13.25}{\mathbf{33.8}}} = \mathbf{1.13}$$

Magnified bending stress $\delta_b \frac{M_x^*}{bD^2} = \mathbf{1.13} \times 3.1 = \mathbf{3.5}$ MPa

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From Chart RC2f32-6 for $p=0.023$, $0.6N_{uo}/bD = 22.5$ MPa ($=\Phi N_{uo}/bD$ at zero moment) and $\Phi M_{ub}/bD^2 = \mathbf{3.6}$ MPa.

$$\frac{N_c}{bD} = \left(\frac{\pi}{5270} \right)^2 350 \left(\frac{\mathbf{182} \times 290 \times \mathbf{3.6}}{1.379} \right) = \mathbf{17.1} \text{ MPa}$$

$$\delta_b = \frac{1}{1 - \frac{13.25}{\mathbf{17.1}}} = \mathbf{4.44}$$

Pages 270 - Amendments shown highlighted in **bold**

Magnified bending stress,

$$\delta_b \frac{M_y^*}{bD^2} = \mathbf{4.44} \times 0.663 = \mathbf{2.9} \text{ MPa}$$

⋮

$$\frac{\Phi M_{uy}}{bD^2} = \mathbf{3.6} \text{ MPa}$$

Exponential to be used in interaction formula,

$$\alpha_n = 0.7 + \frac{1.7 * 13.25}{22.5} = 1.70$$

$$\left(\frac{M_x^*}{\Phi M_{ux}} \right)^{\alpha_n} + \left(\frac{M_y^*}{\Phi M_{uy}} \right)^{\alpha_n} = \left(\frac{\mathbf{3.5}}{5.3} \right)^{1.7} + \left(\frac{\mathbf{2.9}}{\mathbf{3.6}} \right)^{1.7} = \mathbf{1.19}$$

> 1.0 UNSATISFACTORY

The column section will need to be increased or additional reinforcement added. Add two more N32 reinforcing bars for bending about the weak axis. In this case the column is equally reinforced on 4 faces using 8 bars. Charts CR4f are drawn for columns equally reinforced on 4 faces using 12 or more reinforcing bars. Use of charts CR4f is illustrated in example **9**. A conservative result may be obtained using charts CR2f.

It will be necessary to recalculate the stress conditions for bending about the y-axis using the increased steel ratio for **8**N32 bars.

$$\text{Steel ratio } p = \frac{\mathbf{6400}}{350 \times 400} = \mathbf{0.046}$$

$$\text{From chart CR2f32-6 for } p = \mathbf{0.046}, \frac{\Phi N_{uo}}{bD} = \mathbf{29} \text{ MPa and } \frac{\Phi M_{ub}}{bD^2} = \mathbf{5.5} \text{ MPa and}$$

$$\text{buckling stress } \frac{N_c}{bD} = \mathbf{33.8} \text{ determined earlier.}$$

Magnification factor,

$$\delta_b = \frac{1}{1 - \frac{13.25}{\mathbf{33.8}}} = \mathbf{1.64}$$

Magnified design bending stress,

$$\delta_b \frac{M_y^*}{bD^2} = \mathbf{1.64} \times 0.663 = \mathbf{1.09} \text{ MPa}$$

From chart CR2f32-6 for the steel ratio $p = \mathbf{0.046}$ and axial stress $N^*/(bD) = 13.25$ MPa, $\Phi M_{uy}/(bD^2) = \mathbf{3.6}$ MPa.

Page 271 – Amendments shown highlighted in **bold**

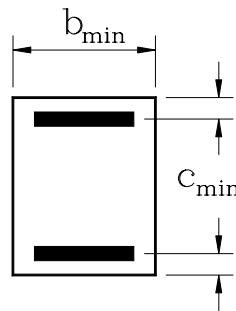
Exponential index for the interaction formula,

$$\alpha_n = 0.7 + 1.7 \frac{13.25}{\mathbf{29}} = \mathbf{1.48}$$

$$\left(\frac{M_x^*}{\Phi M_{ux}} \right)^{\alpha_n} + \left(\frac{M_y^*}{\Phi M_{uy}} \right)^{\alpha_n} = \left(\frac{\mathbf{3.5}}{3.8} \right)^{\mathbf{1.48}} + \left(\frac{\mathbf{1.09}}{\mathbf{3.6}} \right)^{\mathbf{1.48}} = \mathbf{1.06}$$

The result of 1.06 is close to the limit of 1.0 and it may be accepted considering the conservative approach adopted by using the design chart C2f3-6 for columns with equal reinforcement on two faces.

Page 287 Table 3.4 Modify Sketch



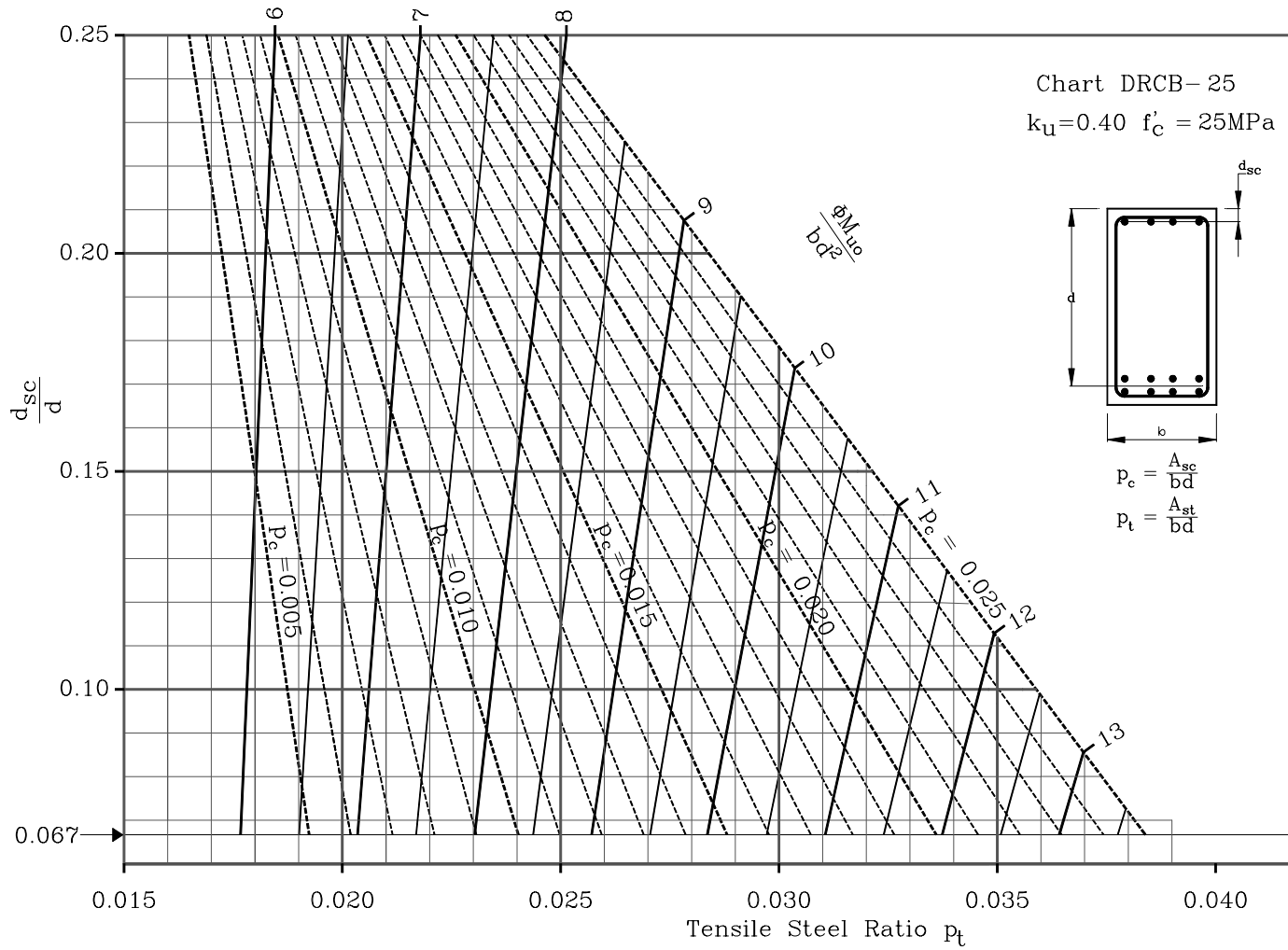
Pages 362 to 377 –Circular Column Charts;

Horizontal Axis should read, $\frac{\Phi M_u}{A_g D}$ and Vertical Axis should read, $\frac{\Phi N_u}{A_g}$

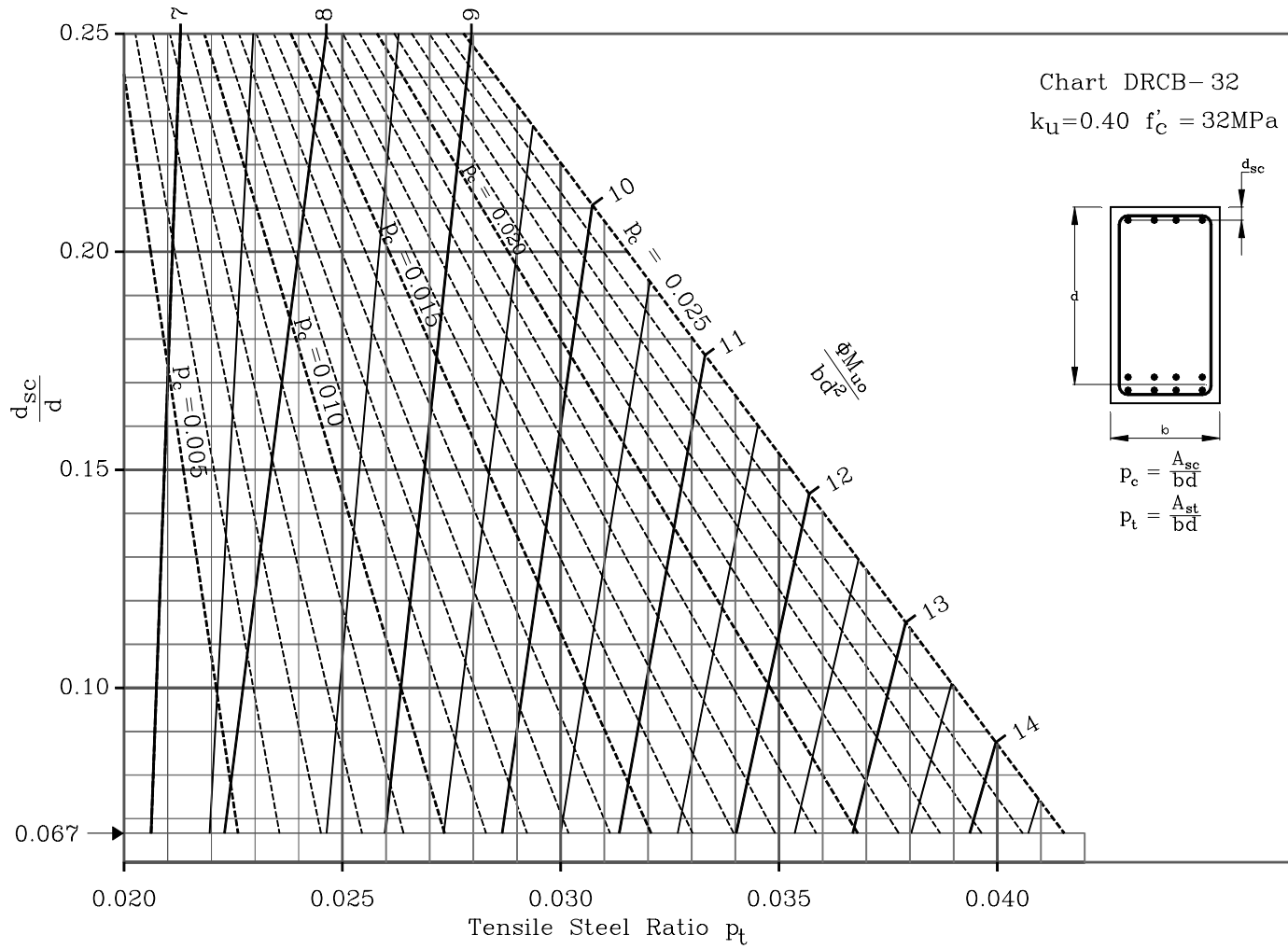
Page 385 – Add page number shown in **bold**

Web Crushing **167**

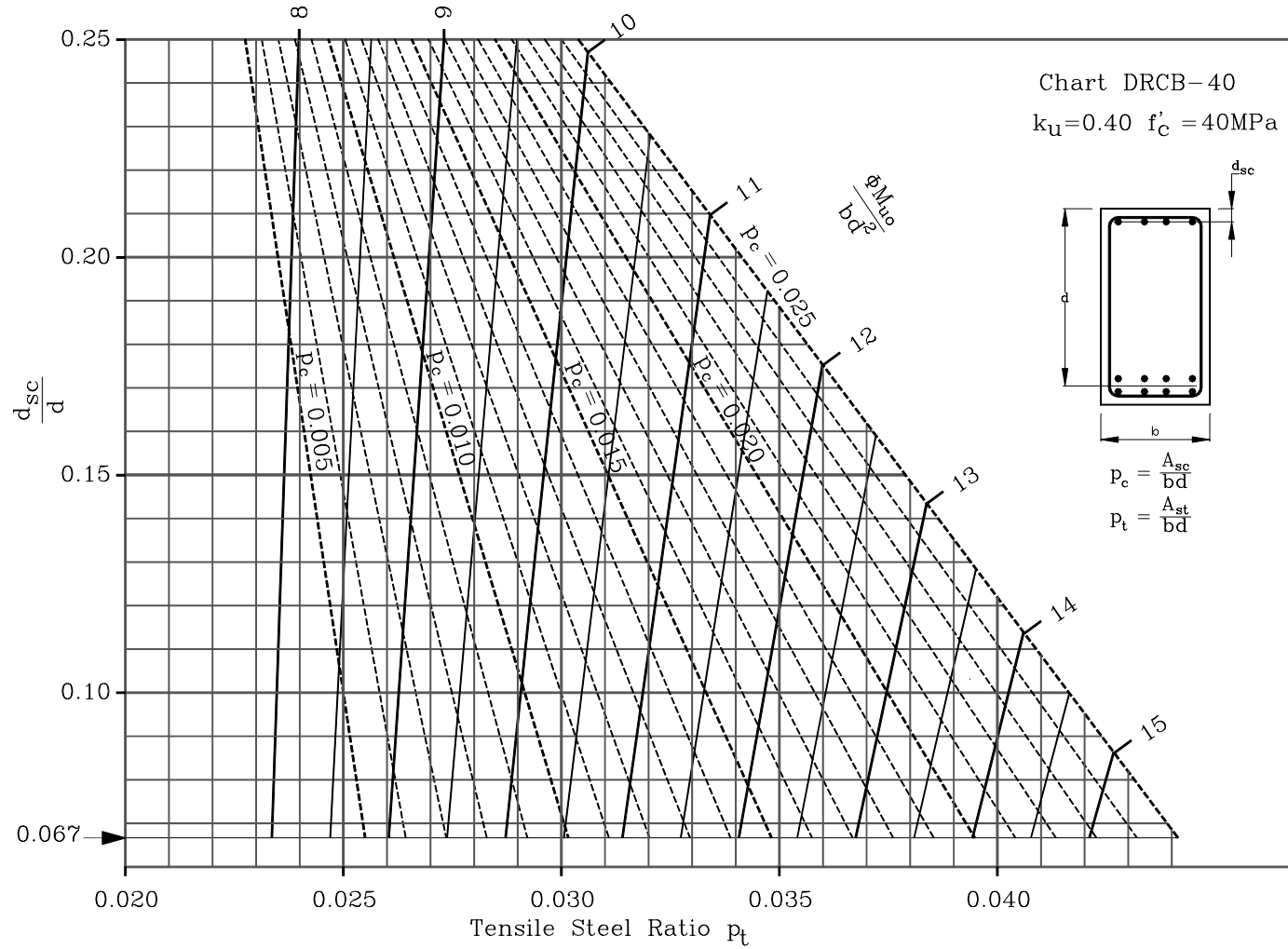
Pages 294 Replace Chart DRCB - 25



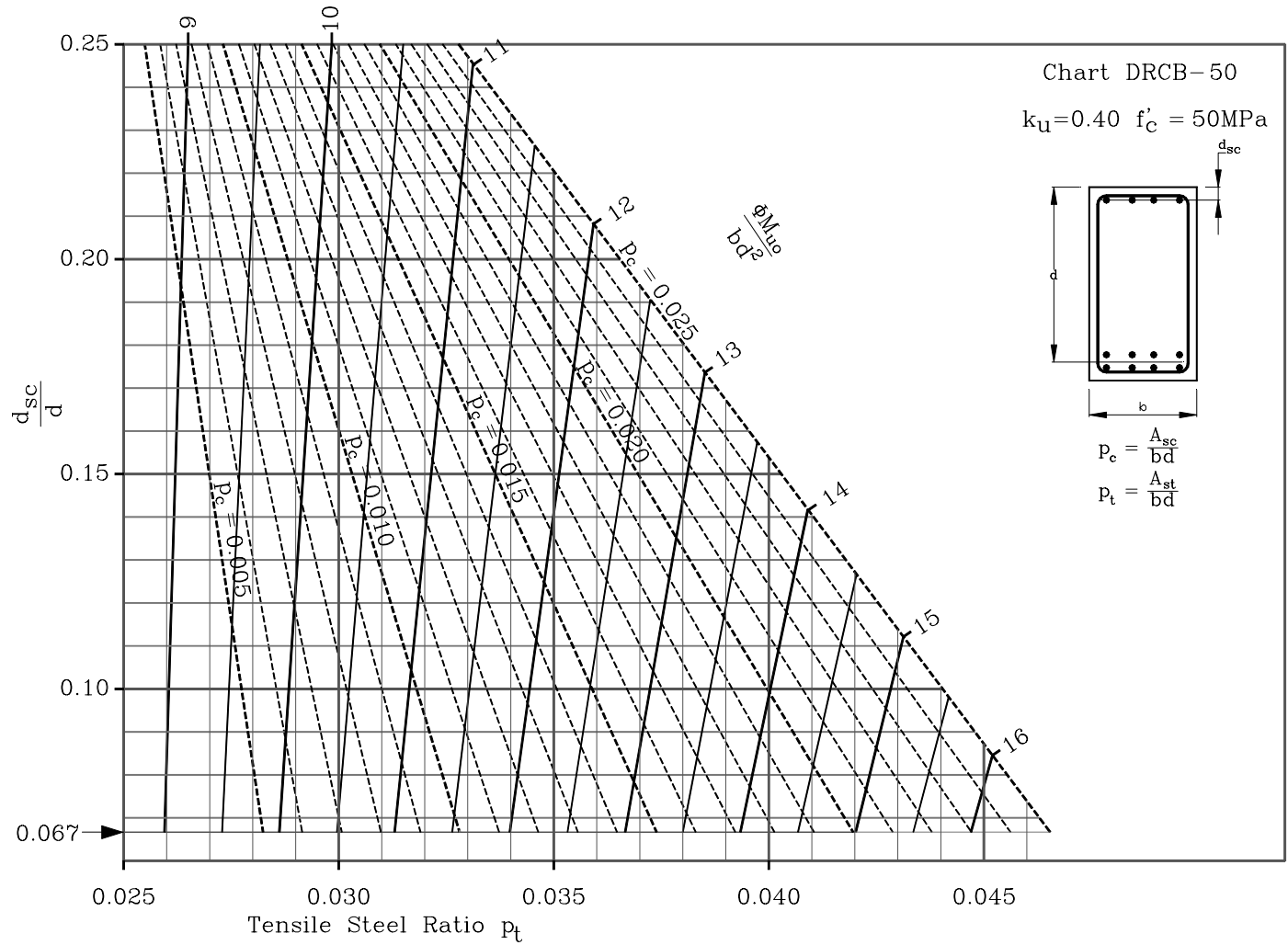
Page 295 Replace Chart DRCB - 32



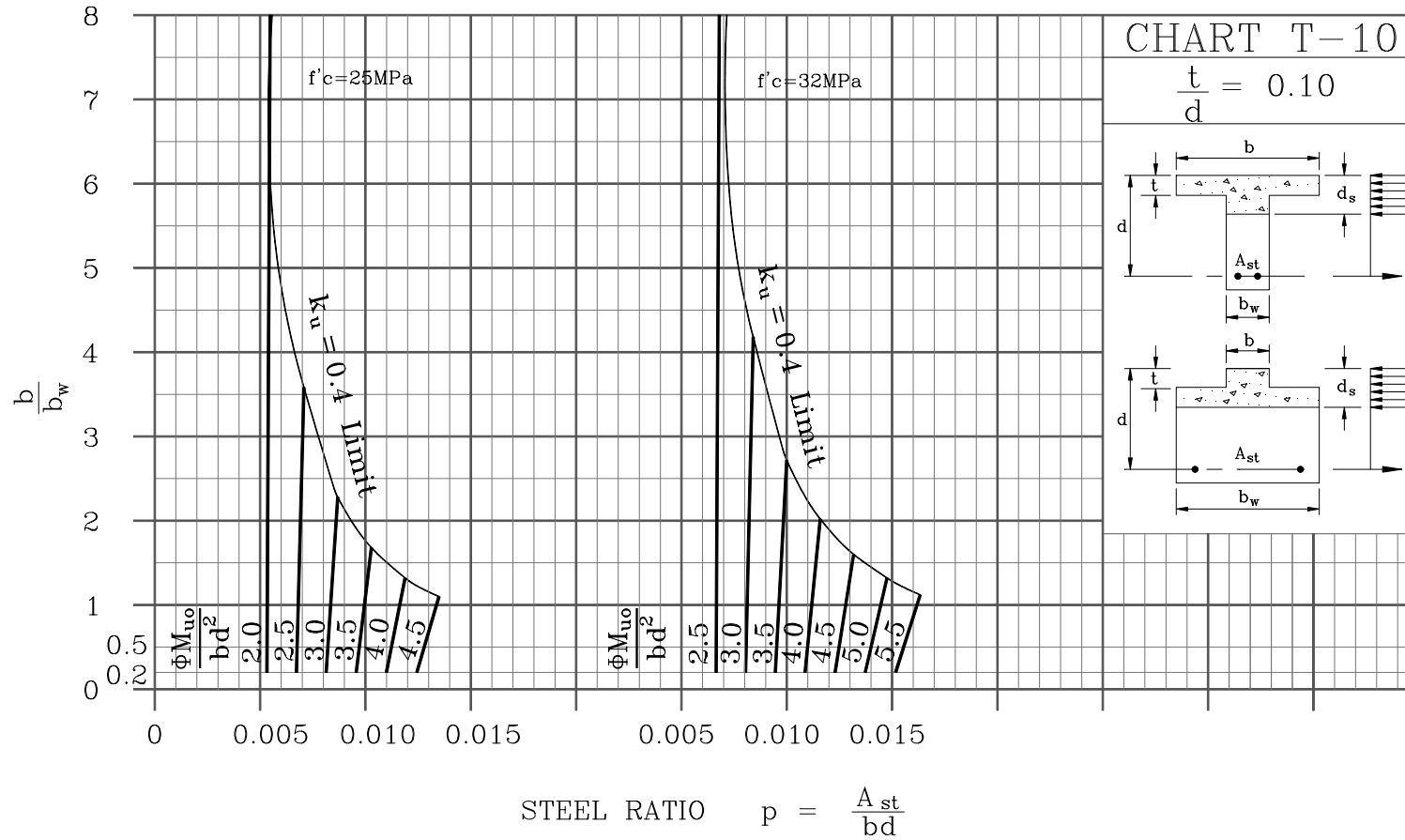
Page 296 Replace Chart DRCB - 40



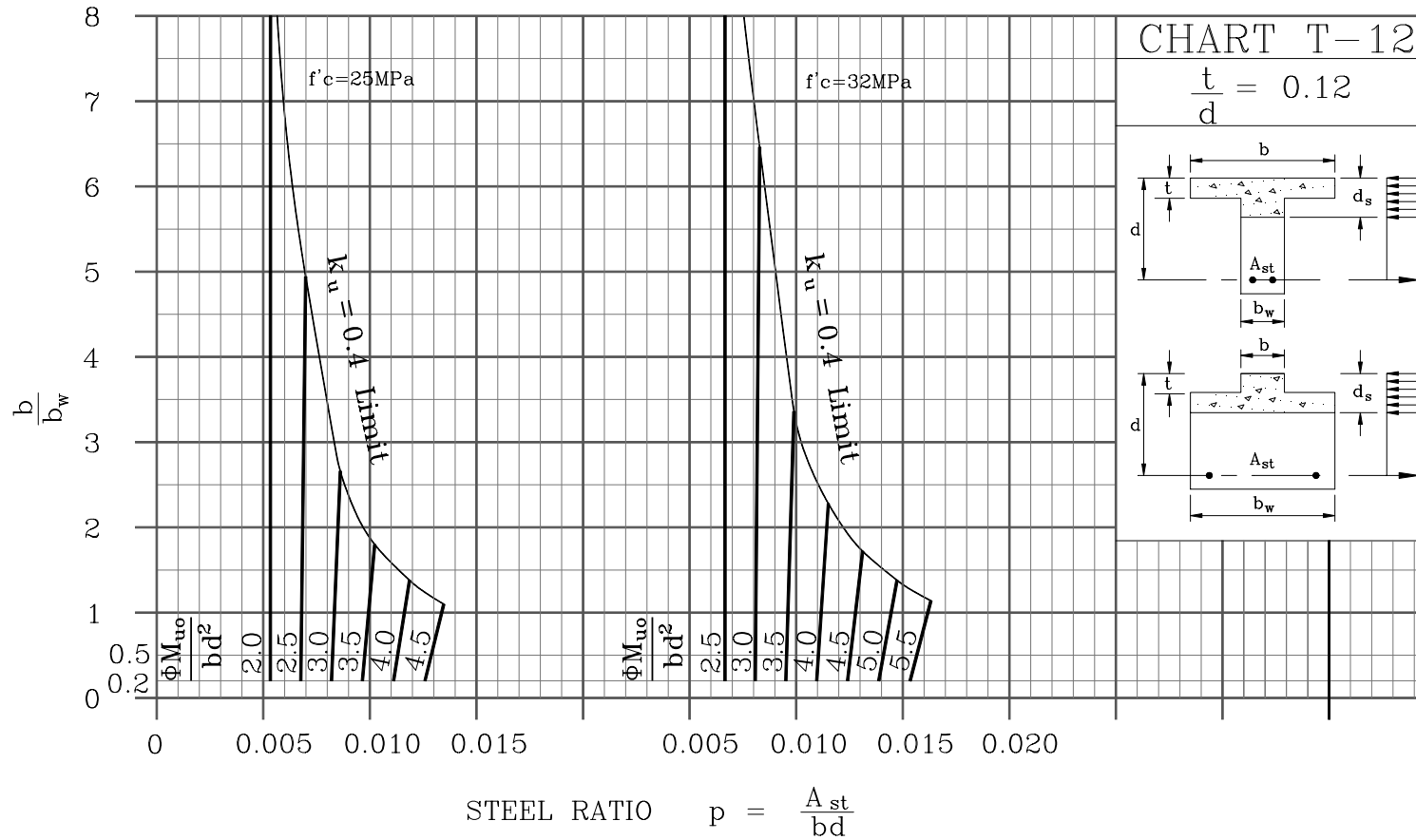
Page 297 Replace Chart DRCB - 50



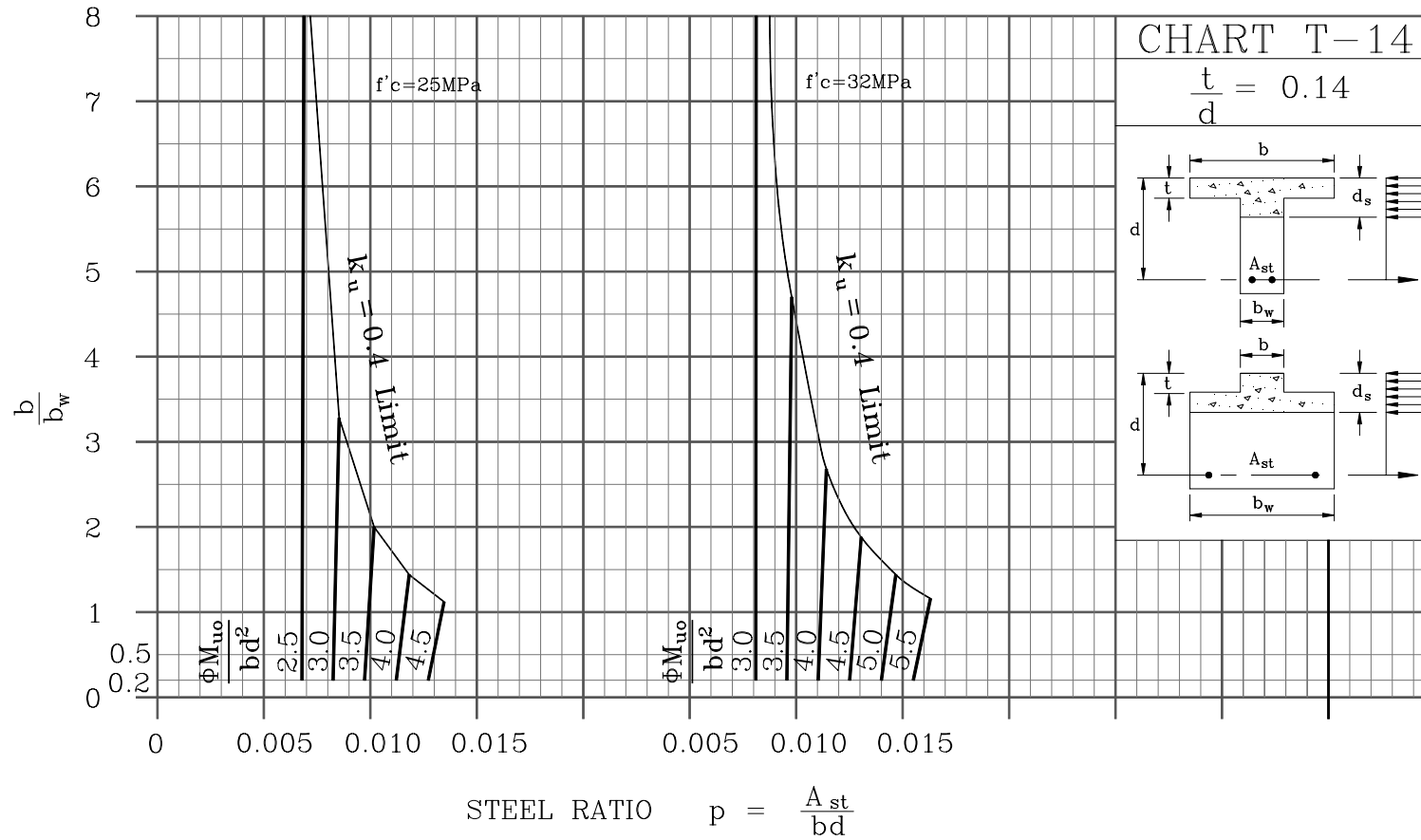
Page 298/299 Replace With Single T-Beam Chart T-10



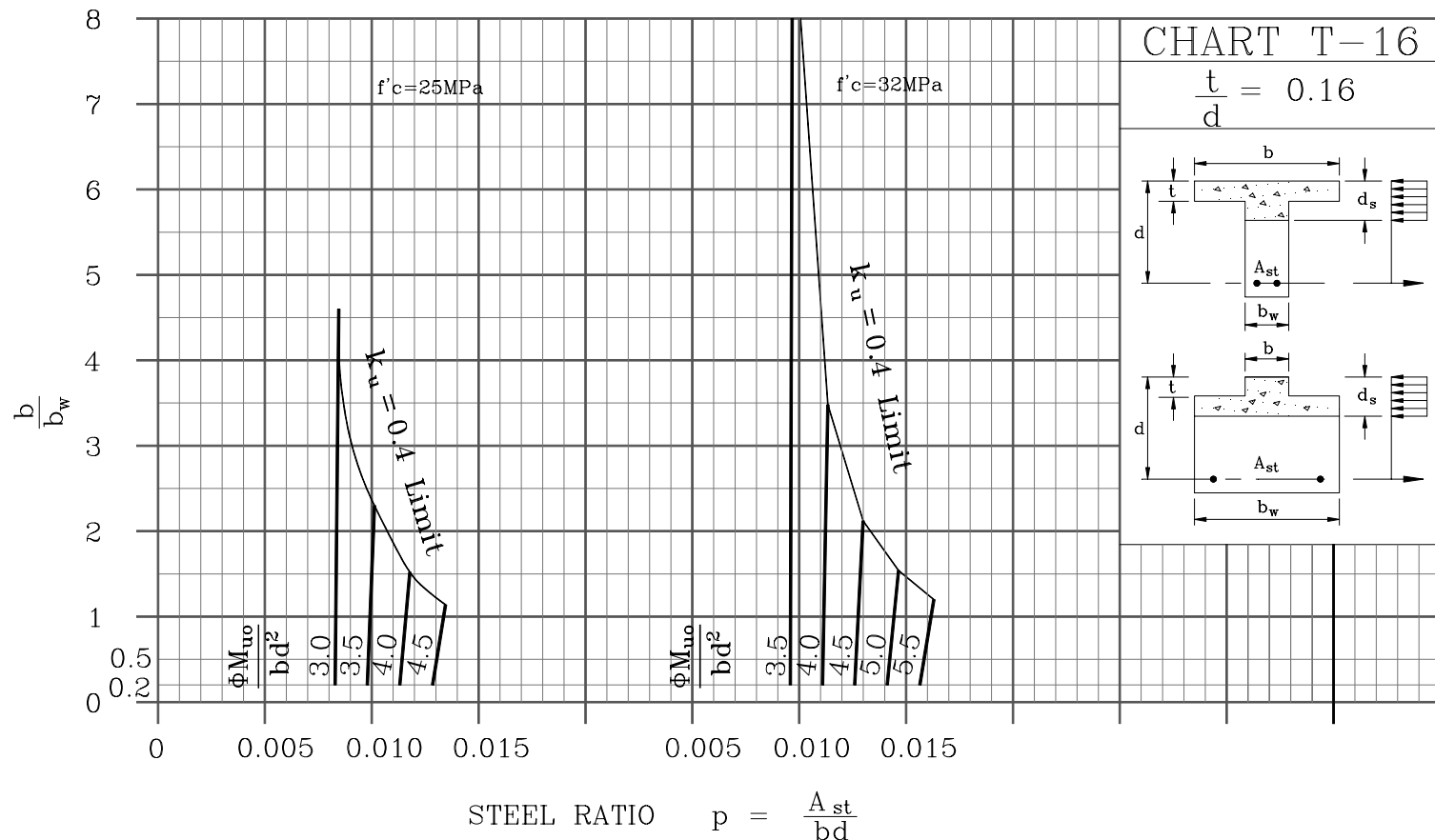
Page 300/301 Replace With Single T-Beam Chart T-12



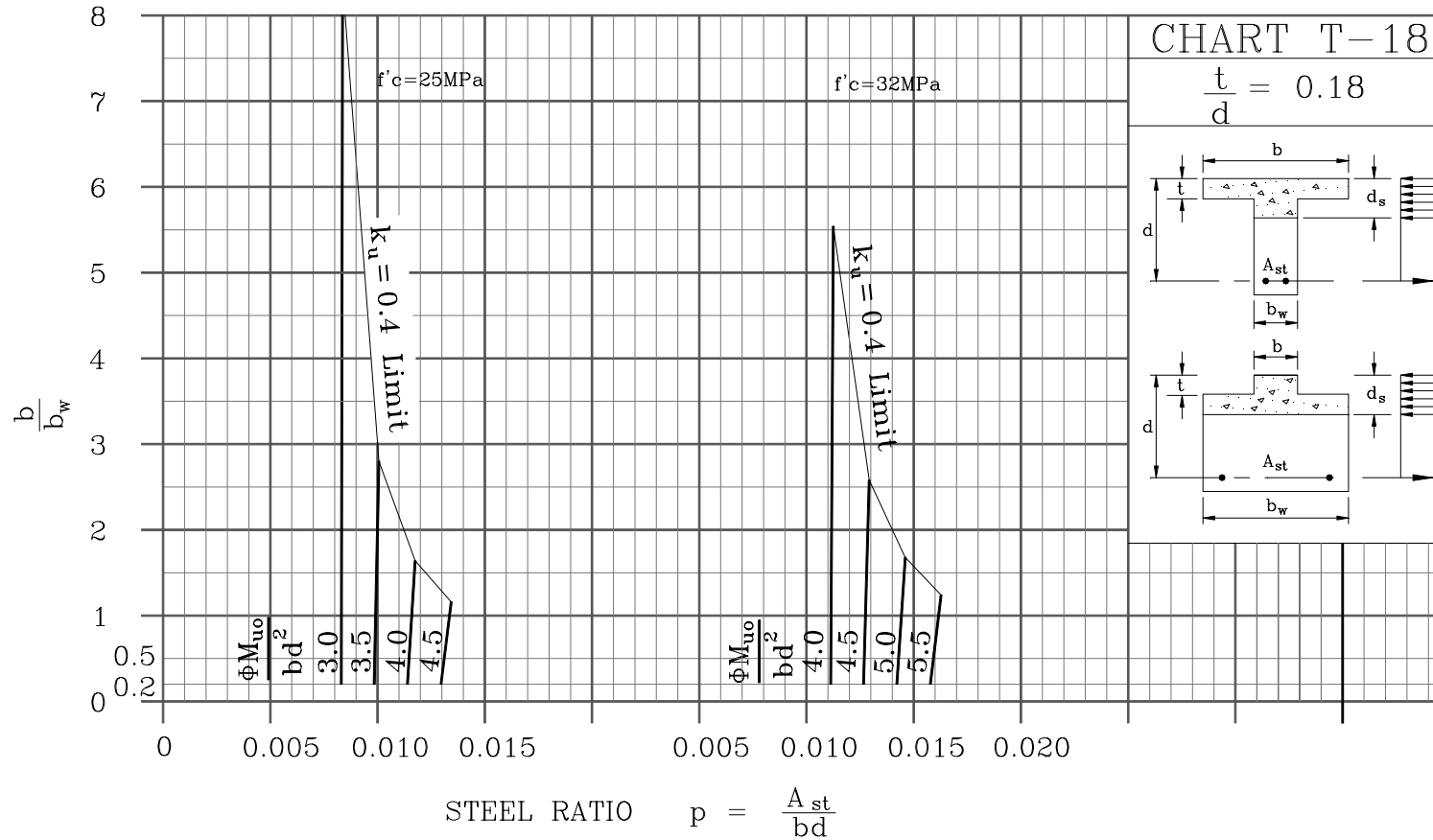
Pages 302/303 - Replace with single T-Beam Chart T-14



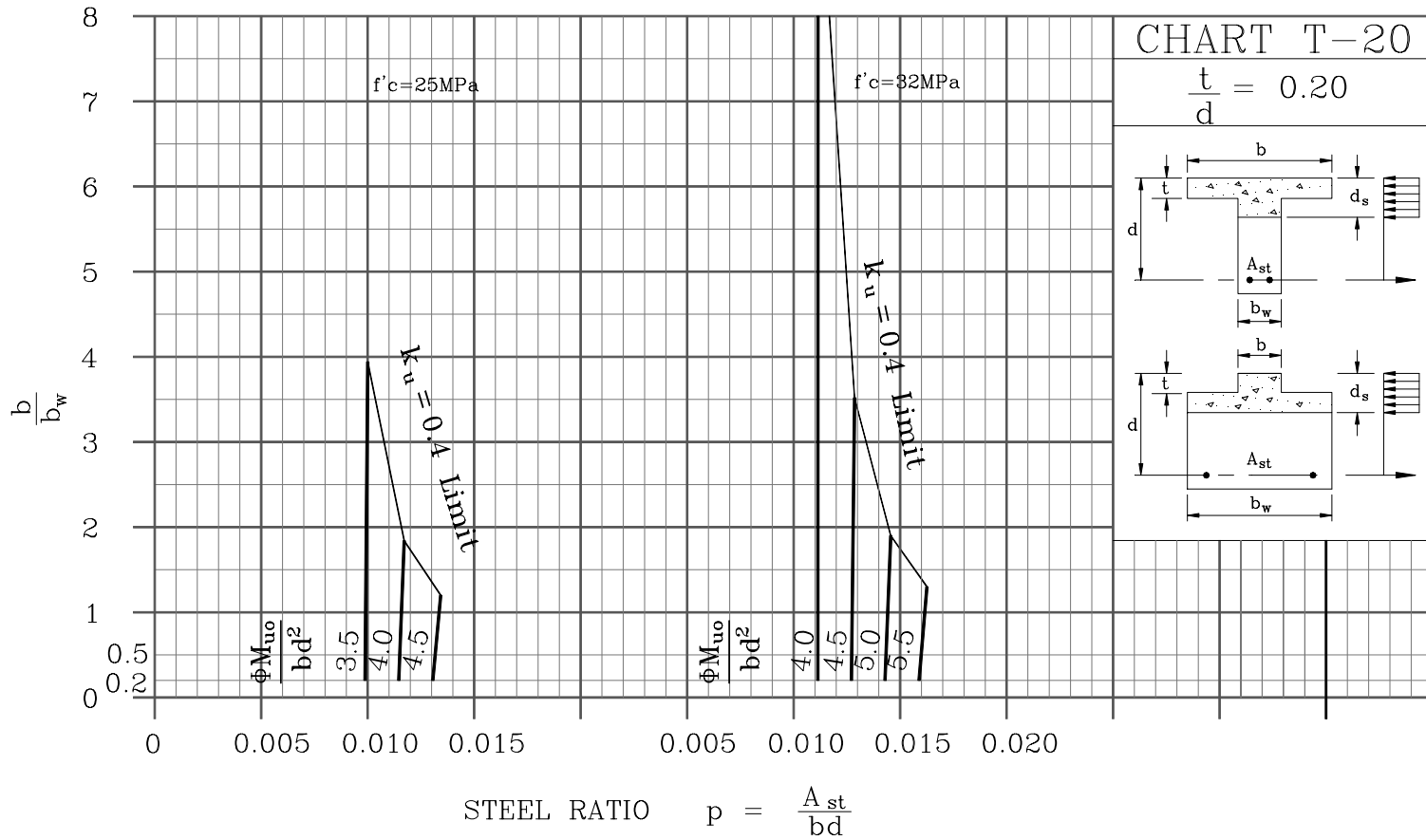
Pages 304/305 - Replace with single T-Beam Chart T-16



Pages 306/307 - Replace with single T-Beam Chart T-18



Pages 308/309 - Replace with single T-Beam Chart T-20



Page 311 Chart D2 – Replace title block

CHART D2

Deemed to comply deflection for slabs

$$\text{Max. } \frac{L_{\text{eff}}}{d} = k_3 k_4 k_5$$

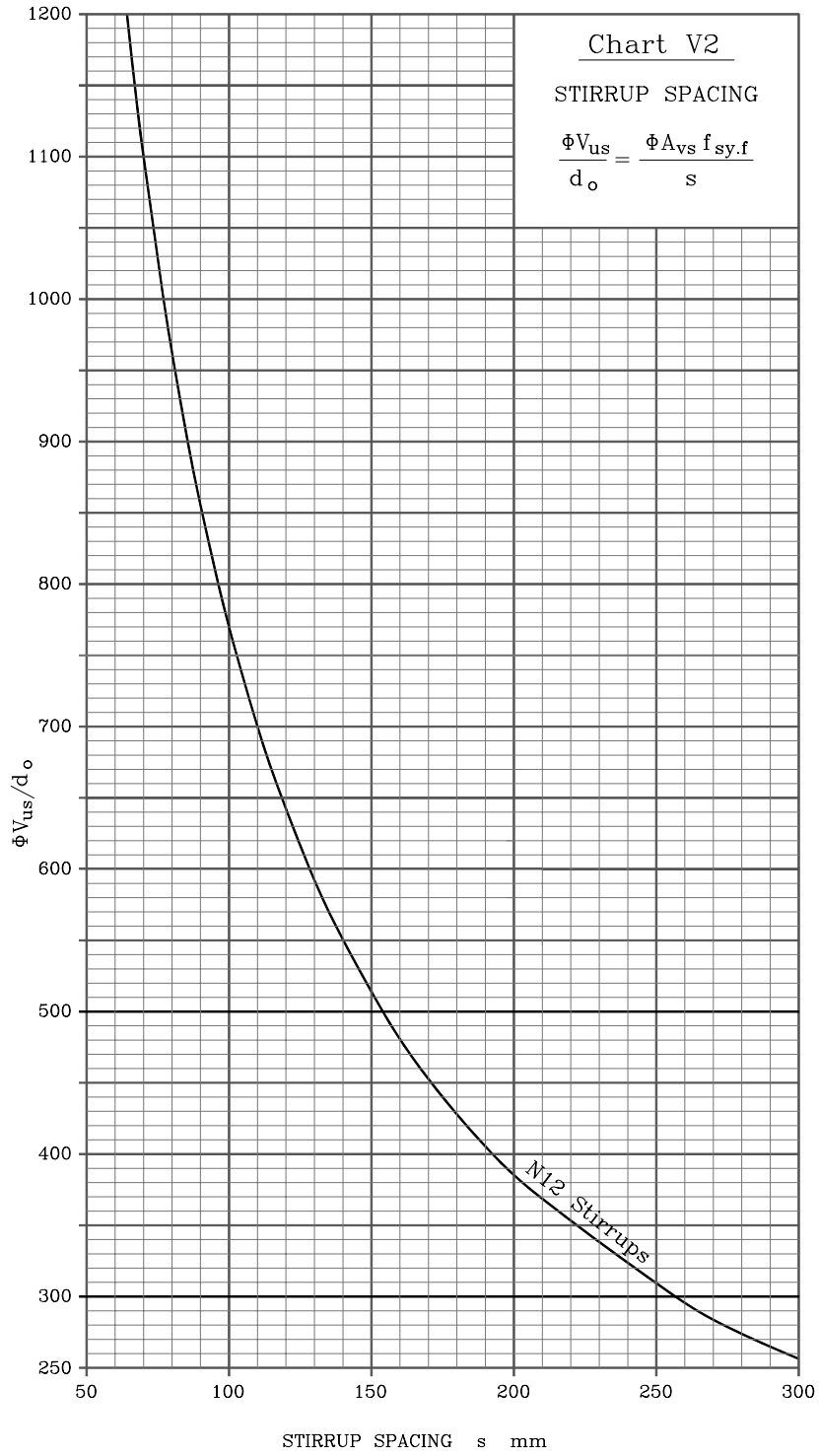
$$k_3 \text{ \& } k_4 \text{ see notes, } k_5 = \left[\frac{1000(\Delta/L_{\text{eff}})E_c}{F_{d,\text{eff}}} \right]^{\frac{1}{3}}$$

$$F_{d,\text{eff}} = (1+k_{cs})g + (\Psi_s + k_{cs}\Psi_1)q \text{ for total deflection}$$

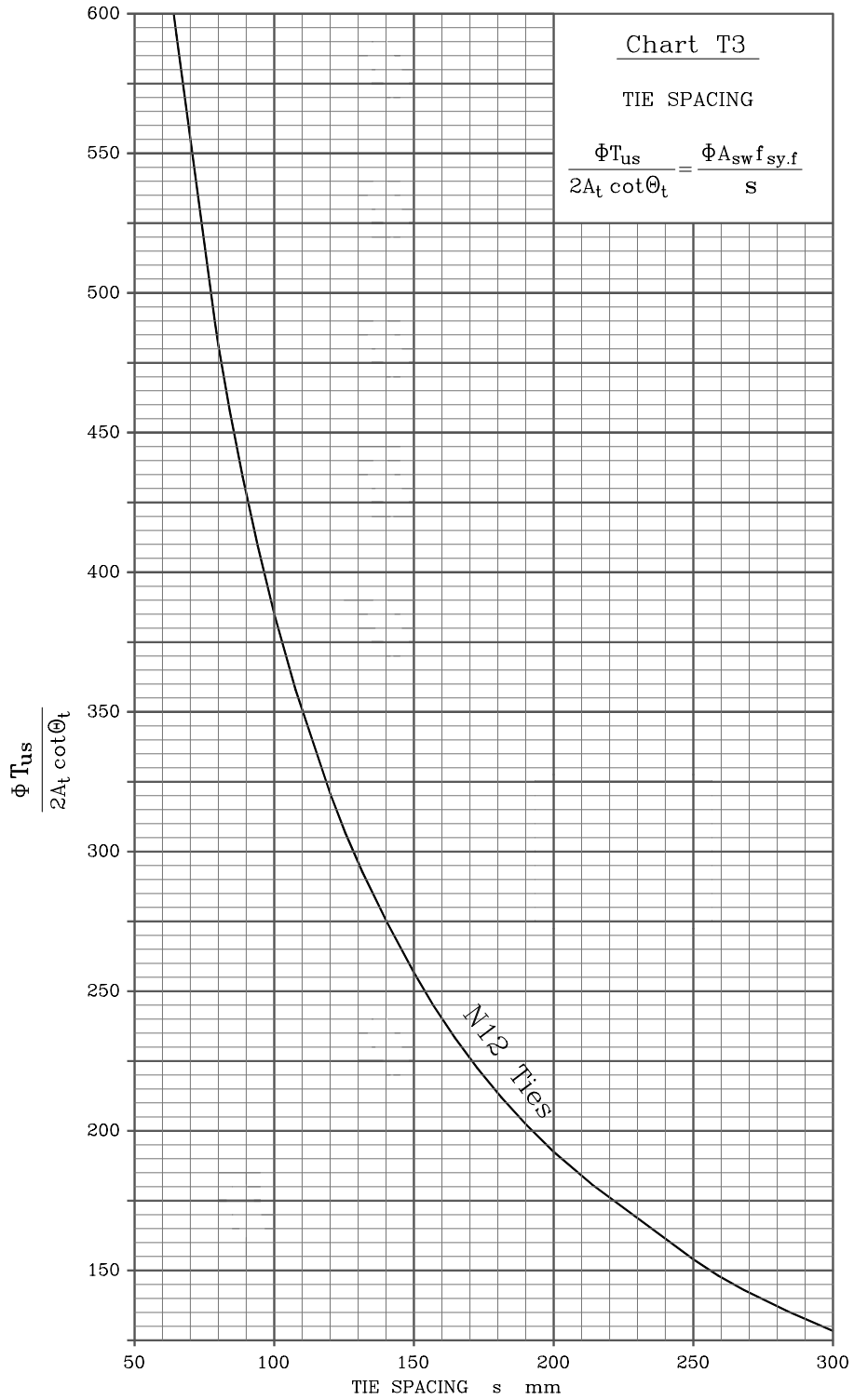
$$= k_{cs}g + (\Psi_s + k_{cs}\Psi_1)q \text{ for incremental deflection}$$

$$k_{cs} = 2 - 1.2(A_{sc}/A_{st}) \geq 0.8$$

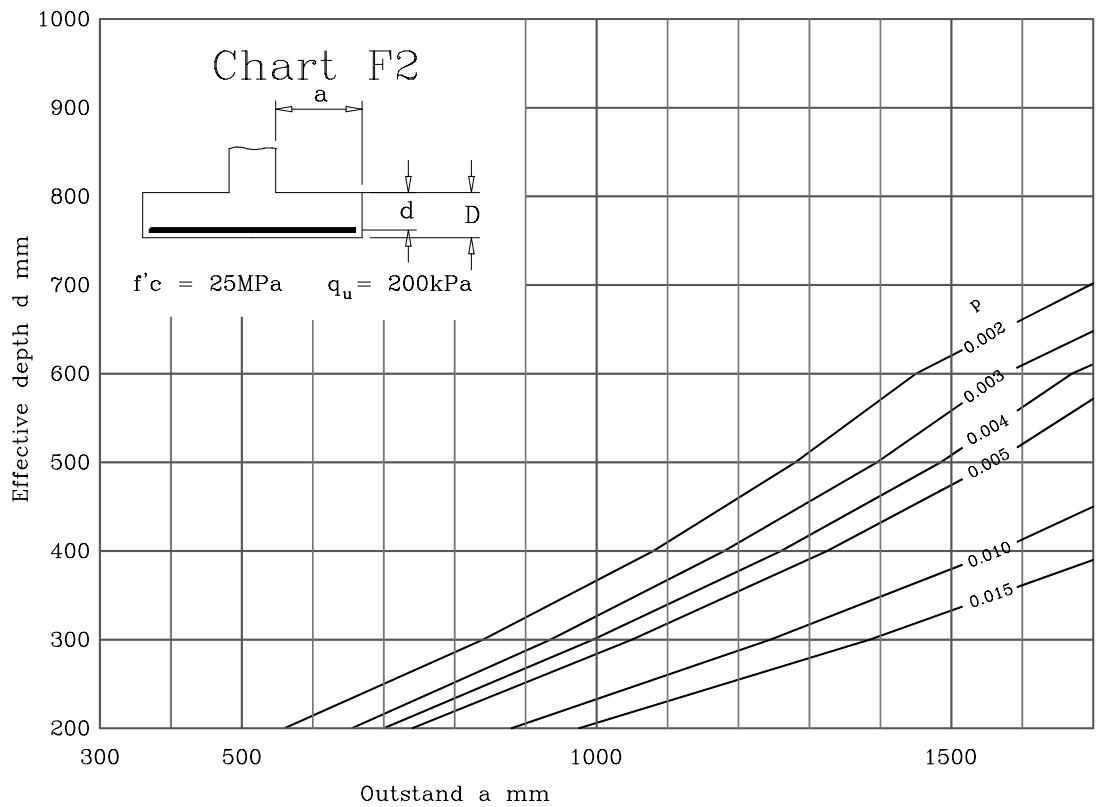
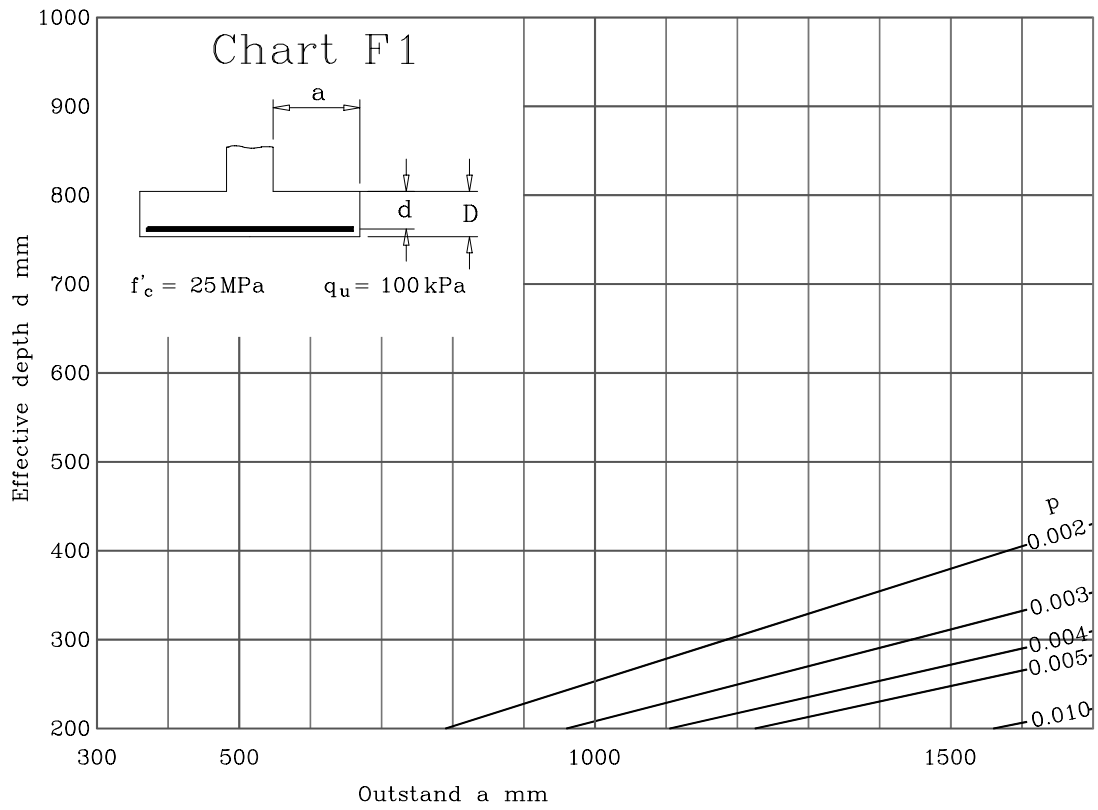
Page 316 replace Chart V2



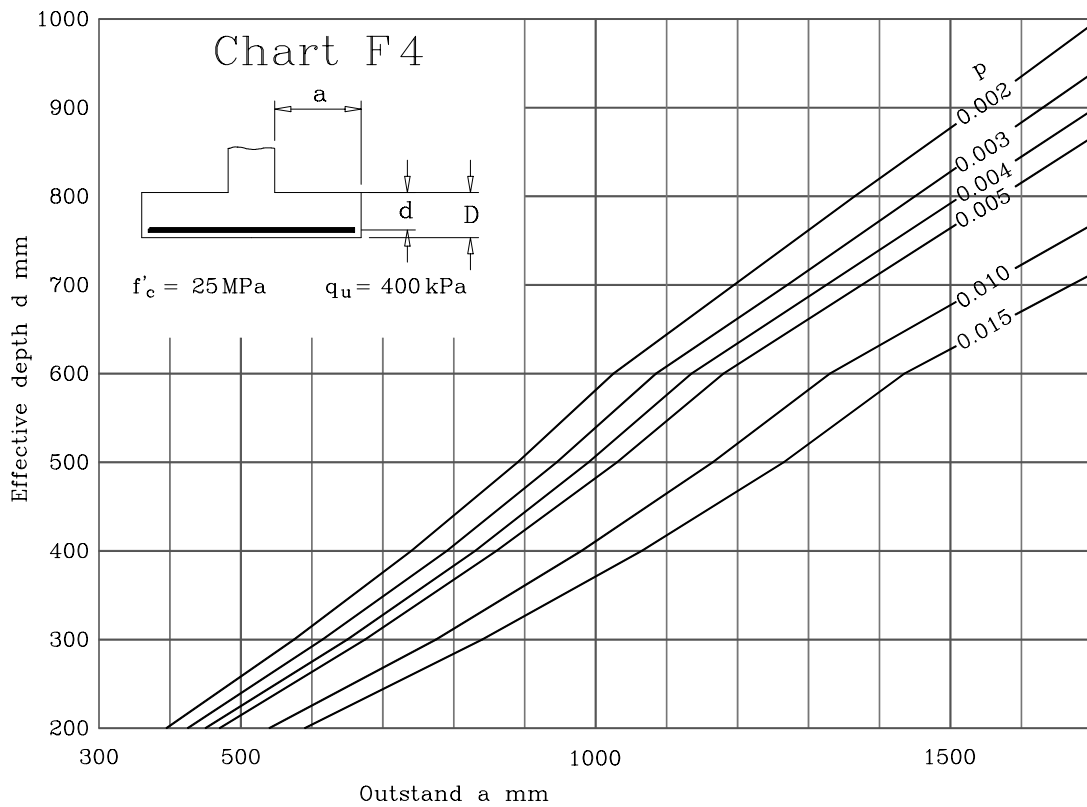
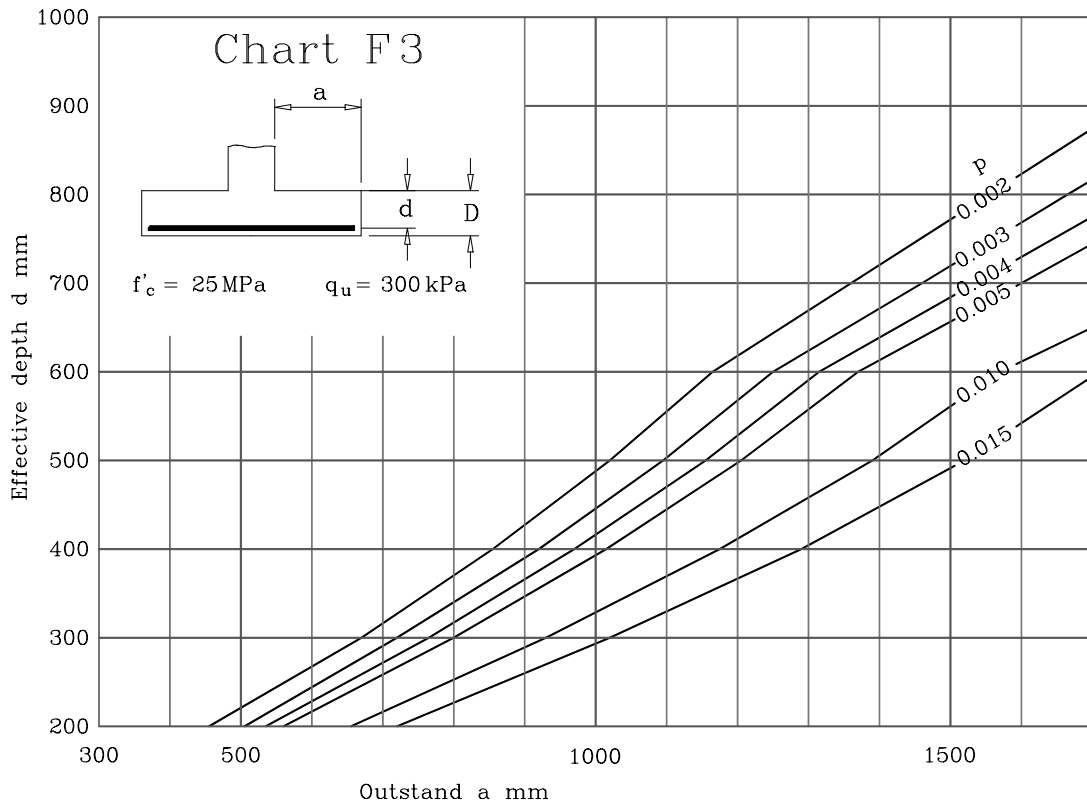
Page 319 replace Chart T3



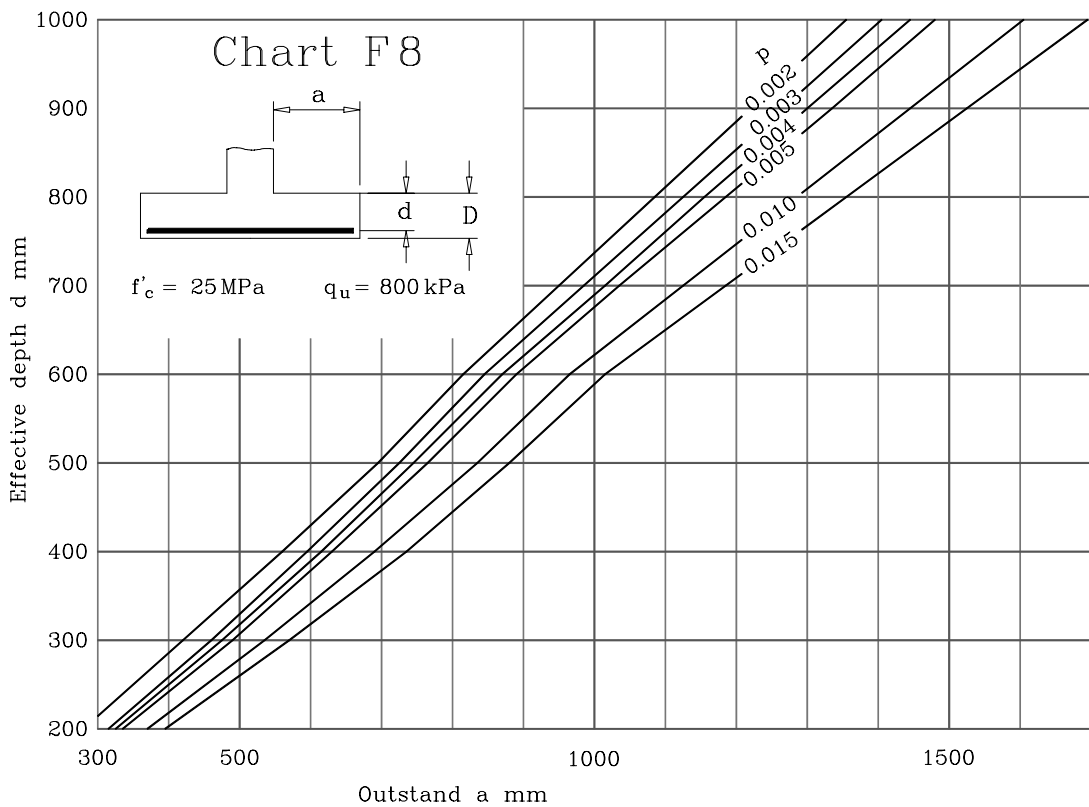
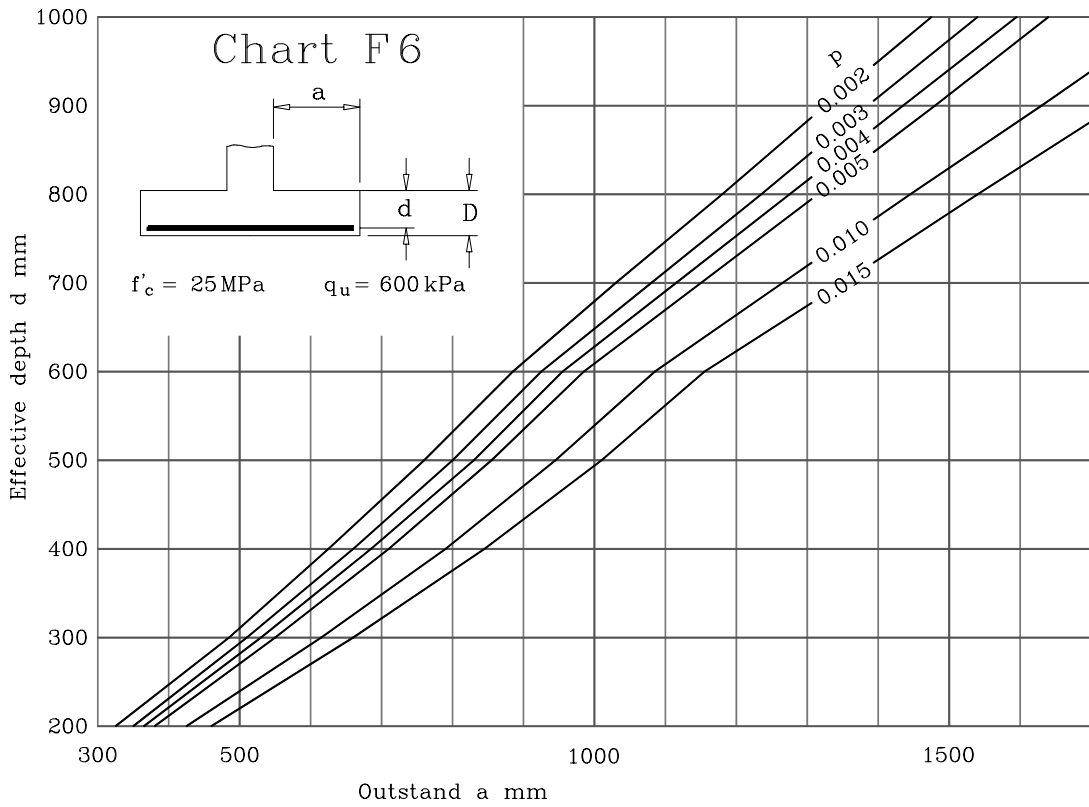
Page 321 Replace charts F1 and F2



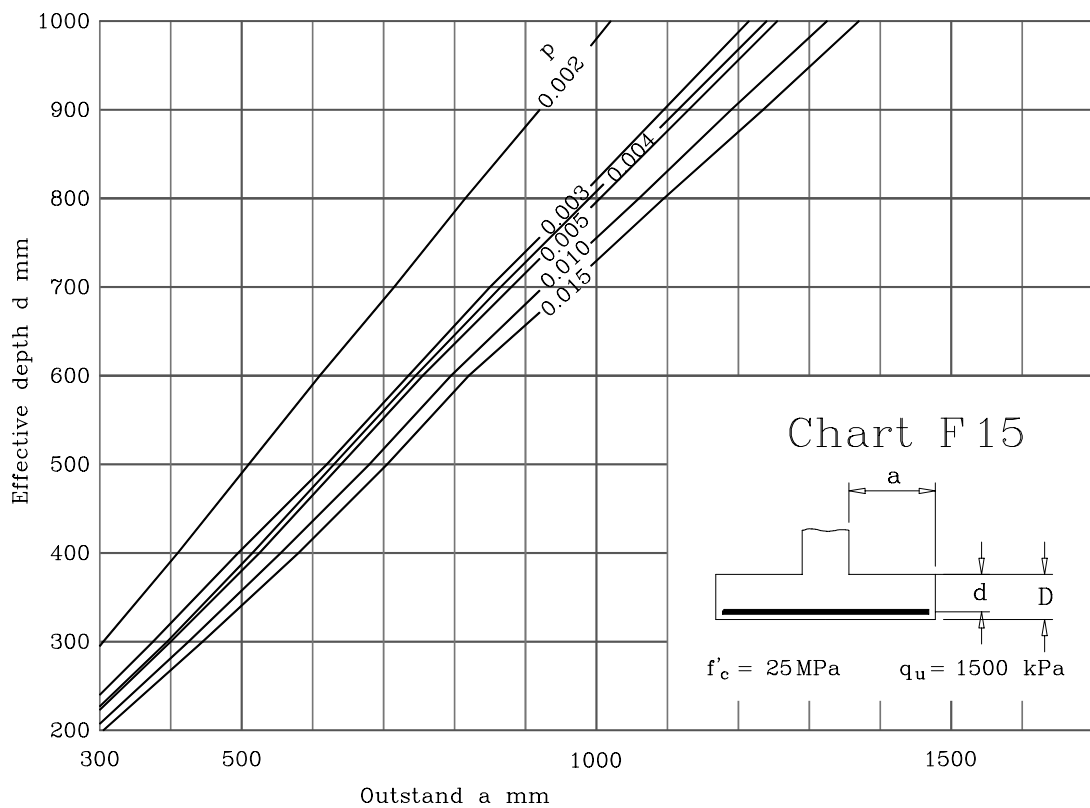
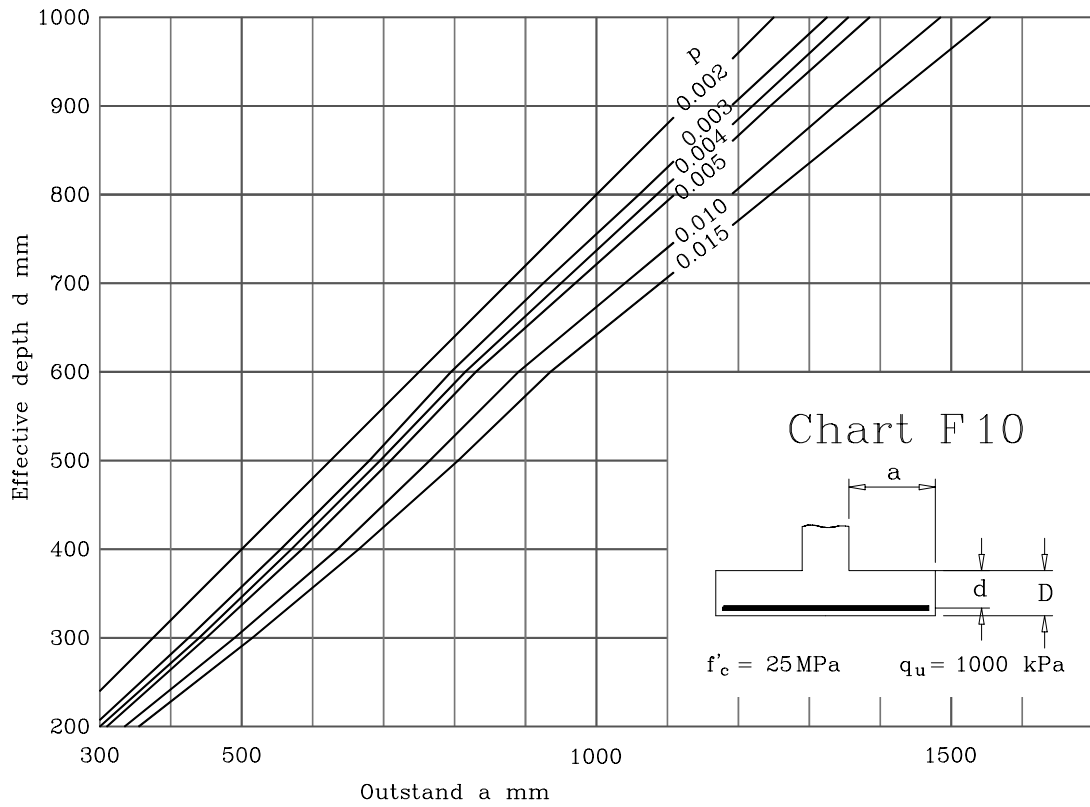
Page 322 Replace charts F3 & F4



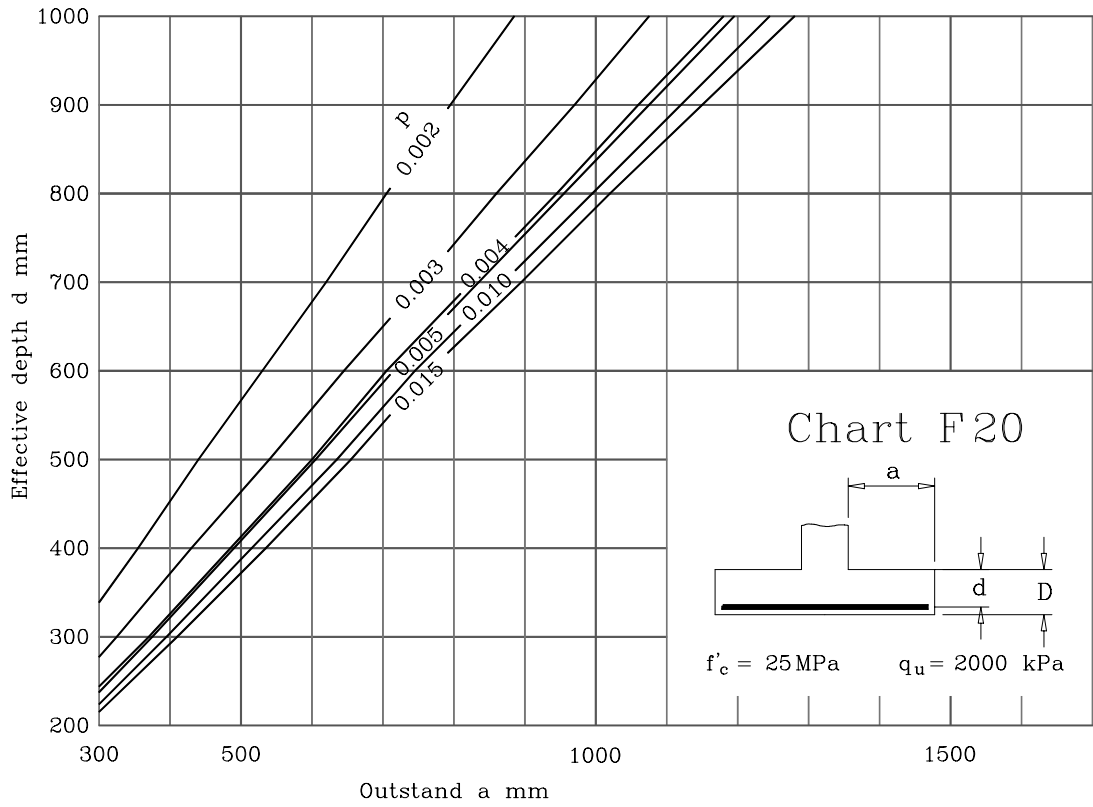
Page 323 Replace charts F6 and F8



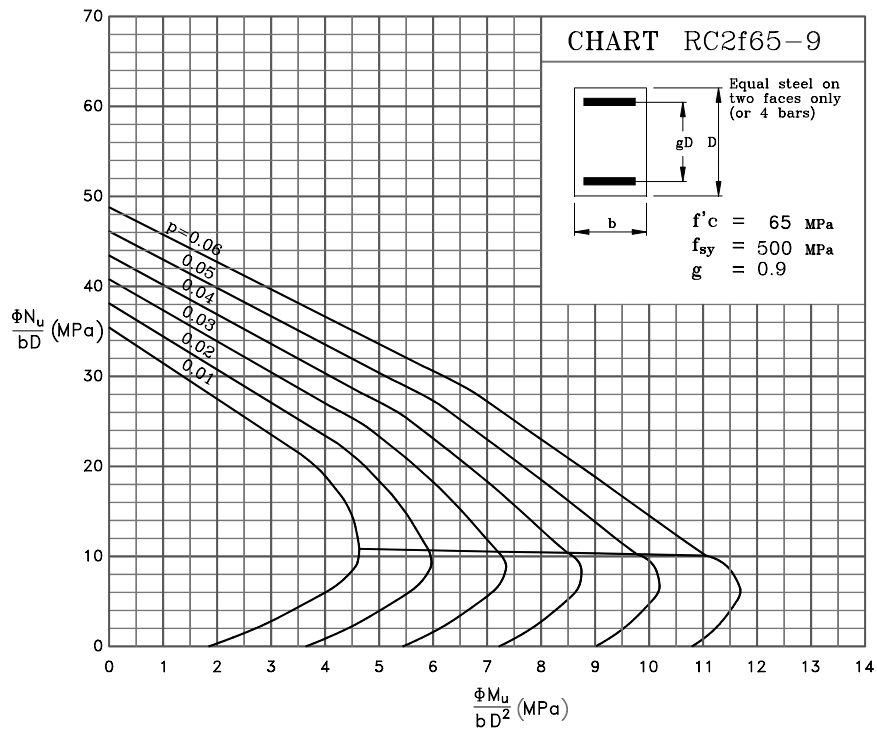
Page 324 Replace charts F10 and F15



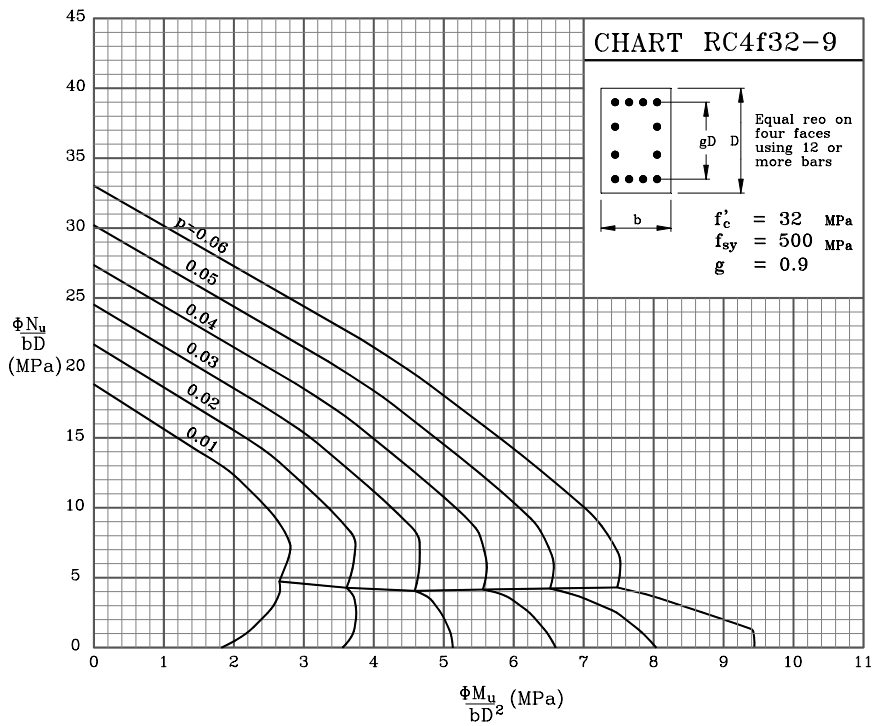
Page 325 Replace chart F20



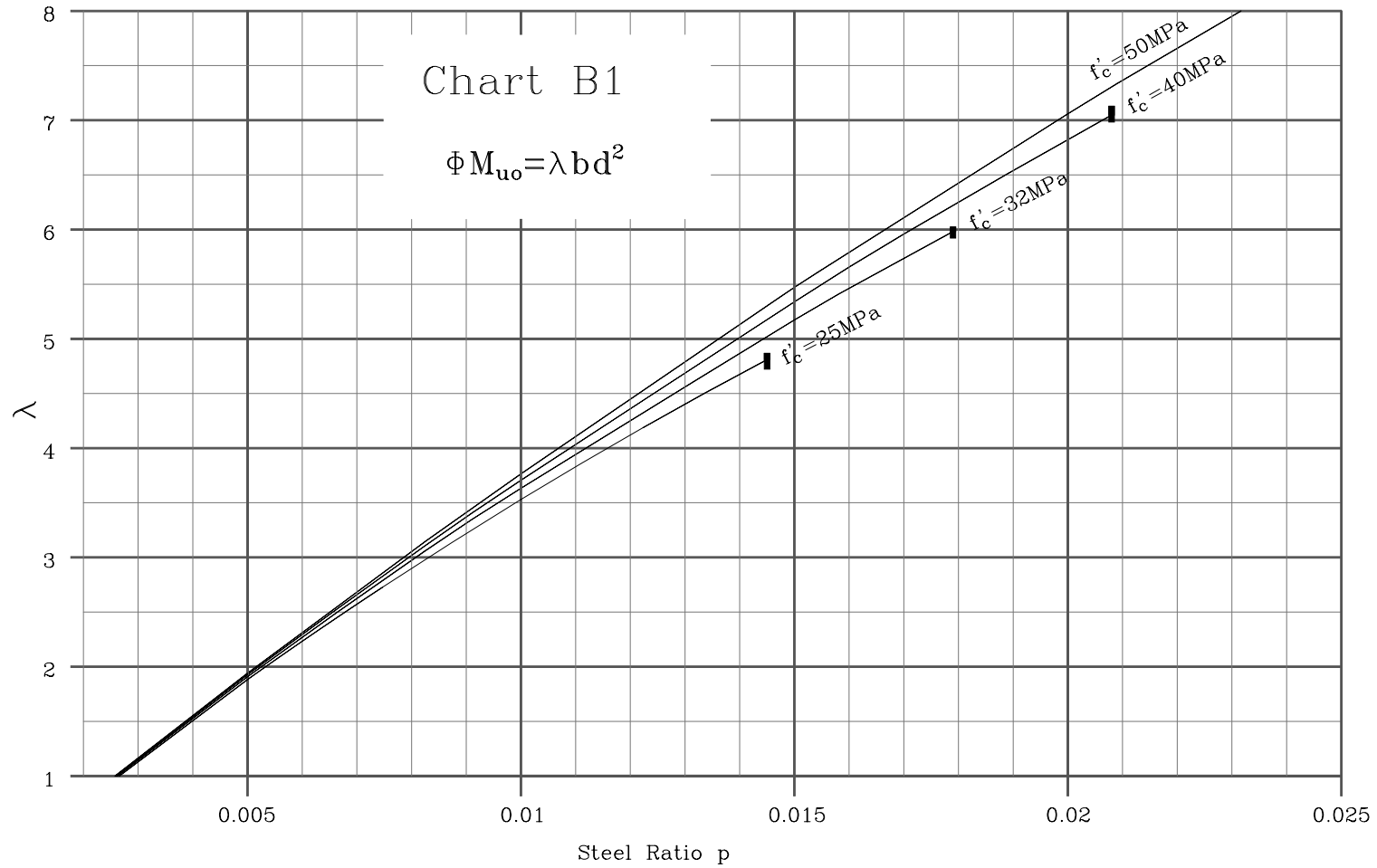
Page 339 replace Chart RC4f65-9 with Chart RC2f65-9 below



Page 349 replace Chart RC2f32-9 with RC4f32-9 below



Design Section Following Page 283 – Enlarged Chart B1 may be added



Optional – Charts SRB25 – SRB50 on pages 290-293 have been redrawn for relevant steel ratios

