February 8, 2008

CAC Concrete Design Handbook, 3rd Edition, Errata

To date three printings of the 3rd Edition of the CAC Concrete Design Handbook have been run. Soft Cover, Hard Cover 1st Printing, and Hard Cover 2nd Printing.

The Errata contained in this file is listed in four sections. Sections 1, 2, and 3 contain errata on both the Explanatory Notes to A23.3-04 and Chapters 1 to 13 of the Handbook. Appendix "A" contains a subject index to the CSA A23.3-04 Standard which was not included with the 3rd edition of the Handbook. Due to popular request the Index has been regenerated and included here for your information in Appendix "A".

Which Sections Apply to My Printing of the Handbook ?

If you have the:

Soft Cover 3rd Edition Handbook: Apply Errata in Sections 1, 2, 3 and Appendix "A".

Hard Cover 3rd Edition 1st Printing: Apply Errata in Sections 2, 3 and Appendix "A".

Hard Cover 3rd Edition 2nd Printing: Apply Errata in Section 3 and Appendix "A" only.

> **Note: Identification of 1st and 2nd Printing**: The second printing of the 3rd edition Hard Cover was erroneously identified on page "ii" as being "First Printing January 2006". The second printing of the Hard Cover edition can be identified by the presence of two figures, "6.1" and "6.1(a)" on page 6-37, while the first printing will show only one figure "6.1".

SECTION 1

Errata for Soft Cover 3rd Edition

Page 2-26 - Table 2.8

On the right hand side of the figure replace the dimension noted as "$\frac{h}{2}$" with "$\frac{h}{2} - 2(h-d)$".

Pages 5-2 to 5-48 - Top of Page

Replace the heading "Short Columns" at the top of the page with "Slabs".

Chapter 9 Errata

Page 9-5 – Revise the last line at the end of section 9.4.3.1 as shown below:

Replace
"Tables 9.1 to 9.3 include the larger d_v calculated from equations (9.2) and (9.3)."

with

"Tables 9.1 to 9.3 consider all conditions set out in Clauses 11.3.6.2, 11.3.6.3 and 15.7. When $3d < a_b$ the smallest d value was used calculated based on Clause 11.3.6.3.(b) and $a_b/3$."

Page 9-6 – In the first line at the top of the page under section 9.4.3.2 revise the text "Equation (13.6)" to read "Equation 13-6".

Also revise the 2nd line on page 9-6 as follows:
Revise
"than Equation (13.7), thus tables 9.4 to 9.6 are based on Equation (13-7)."

To read:
"than Equation (13-7), thus tables 9.4 to 9.6 are based on Equation (13-7). For consideration of Clause 13.3.4.4 see note under Table 9.4. "

Page 9-22 - In step 2 of "Example 9.7.3 Square Footing" revise:

"From Table 9.1 $d_v = 330$ mm, thus $d = d_v/0.9 = 367$ mm"
to read
"From Table 9.1 $d_v = \underline{333}$ mm, thus $d = d_v/0.9 = \underline{370}$ mm"

Page 9-23 - At the top of the page following the expression for "d_{ave}" insert the following line of text:
"Since $3d_{ave} = 3(0.406) = 1.22m > a_b = 1.0m$, Clause 13.3.4.4 is not applicable."

Page 9-24 - In the 6th line at the top of the page in step 3.2 of Example 9.7.4 revise the text as follows:

Revise
"Therefore the minimum depth from the two-way stress condition is d ≥ 1.46(0.5) = 0.73 m. "

to read

"Therefore the minimum depth from the two-way stress condition is d ≥ 1.46(0.5) = 0.73 m. Since $3(0.73) = 2.19m > a_b = (3.1 - 0.5)/2 = 1.3m$, Clause 13.3.4.4 is not applicable. "

Page 9-25 – Revise the last line of text on this page as follows:
Revise
"qsf = 300 kPa, from Table 9.1 dv = 593 mm and d = dv /0.9 = 659 mm. "

to read

"qsf = 300 kPa, from Table 9.1 dv = 600 mm and d = dv /0.9 = 667 mm. "

Page 9-26 - Insert the following line of text between the 6th and 7th lines of text at the top of the page:
"Clause 13.3.4.4 is not applicable since $3(0.585) = 1.76m \cong a_b = 1.8m$."

Page 9-27 - In step 2 revise:
"From Table 9.3: d_v = 458 + (510 - 458)(8.2)/50 = 467 mm, thus d = d_v /0.9 = 519 mm."
to read
"From Table 9.3: d_v = 533 mm, thus d = d_v /0.9 = 592 mm."

Page 9-27 - In step 3.1 revise the text as follows:
Revise
"From Table 9.3: dv = 458 + (510 - 458)(26.8)/50 = 486 mm, thus d = 486/0.9 = 540 mm."
to read
"From Table 9.3: dv = 533 mm, thus d = 533/0.9 = 592 mm."

Page 9-28 - In step 3.2 revise the 4th and 5th lines of text as follows:

"Since $h_e = \sqrt{A_c} = \sqrt{250(500)} = 354$ mm thus $d = 1.92(354) = 679$ mm > 592 mm, thus two-way shear governs. Use minimum $d = 700$ mm. Note: Clause 13.3.4.4 is therefore not applicable."

Page 9-30 - Revise the 8th line in step 2.2 as follows:

"From the $V_r = V_f$ equation d = 0.705 m ~ 0.7 m. Note: Clause 13.3.4.4 is therefore not applicable."

Page 9-32 – Revise the "Two-Way Shear Figure 9.7.7-3(b)" as shown below. The right hand vertical dashed line has been relocated to the right so that all vertical and horizontal lines intersect the Vr curve at the same point. See below:

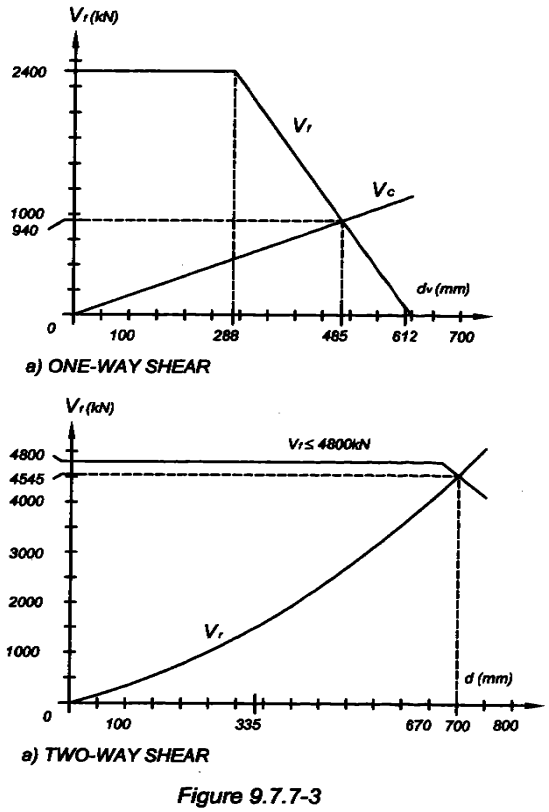


Figure 9.7.7-3

Page 9-33 - In Step 2.2 revise the line starting with "The solutions yields d = …" as noted below:

"The solution yields d = 568 mm with $V_f = 3.13$ MN < 8(0.55) = 4.4 MN
Note: Clause 13.3.4.4 is therefore not applicable."

Page 9-40 - Add the following note at the bottom of Table 9.4 and also at the bottom of Table 9.6 on Page 9-41

"See page 48 for the note to tables 9.4 to 9.6."

Page 9-48 - Add the following text below Table 9.11:

"Note to Tables 9.4 to 9.6 - Tables 9.4 to 9.6 are worked out as described in paragraph 9.4.3.2 of the Handbook. Thus for the given q_{sf} and A_f/A_c initial design parameters, a d/h_e ratio is calculated based on Equation (13-7). Clause 13.3.4.4 however would yield a different/larger d/h_e value for the same q_{sf} and A_f/A_c initial design parameters, for cases where $3d < a_b$. When $3d < a_b$ the smallest d value shall be used calculated based on Clause 13.3.4.4 and $a_b/3$.
Clause 13.3.4.4 (thus Clause 13.3.4.3) in combination with Equation (13-7) results in a cubic equation (refer to Equation 9.4 in the Handbook)"

Chapter 11 Errata:

Page 11-17 - In the paragraph above Fig 1.9 under the heading "Span AB:"
In the second line replace the reference to "(Table 11.7)" with "(Table 11.5)".

Page 11-19 - Top of page.
In the second line immediately following Figure 11.10 in the equation
'$V_r = \phi_s A_v f_y d / s$" The term "d" should be "dv" to give "$V_r = \phi_s A_v f_y d_v / s$".

Page 11-19 - Top of page. 5th line down.
Replace the equation "$s = \dfrac{0.85 \times 400 \times 400 \times 527}{234 \times 1000} = 306$" with the following:
"$s = \dfrac{0.85 \times 400 \times 400 \times \underline{0.9} \times 527}{234 \times 1000} = \underline{276}$". The 0.9 factor has been added to the numerator.

This changes the subsequent equation for "$s = \dfrac{234}{262} \times 306 = 273$" two lines further down to read: "$s = \dfrac{234}{262} \times \underline{276} = \underline{247}$".

Page 11-19 - Revise the equations noted below as indicated. The revisions are underlined.

Revise:
"(iii) Spacing limits (Clause 11.3.8.3):
Since $V_f < 0.125\, \phi_c\, f'_c\, b_w\, d = 0.125 \text{ x } 0.65 \text{ x } 30 \text{ x } 400 \text{ x} 0.9 \times 527 = 462\ kN$
then $s_{max} = 600$ mm or $0.7d = 0.7 \times 0.9 \times 527 = 332$ mm.

Note that near the ends of the beams the stirrup spacing required for shear cannot exceed 306 and 273 mm for spans AB and BC, respectively."

to read:

"(iii) Spacing limits (Clause 11.3.8.3):

Since $V_f < 0.125\,\phi_c\, f'_c\, b_w\, \underline{d_v} = 0.125\ x\ 0.65\ X\ 30\ x\ 400\ x 0.9 \times 527 = 462\ kN$

then $s_{max} = 600$ mm or $0.7\underline{d_v} = 0.7 \times 0.9 \times 527 = 332$ mm.

Note that near the ends of the beams the stirrup spacing required for shear cannot exceed 276 and 247 mm for spans AB and BC, respectively."

Page 11-19 - in the paragraph under 11.4.4.5:
In the 4th line revise "Fig. 11.10" to read "Fig. 11.11".
In the 5th line revise "Clause 21.2.3" to read "Clause 21.3.2.3".

Page 11-19 - in the paragraph under 11.4.4.6:
In the 3rd line revise "Fig. 11.11" to read "Fig. 11.10".

Page 11-25 - At the end of the first paragraph under 11.4.5.5 replace " 164 kN" with "132 kN".

Page 11.27 - In the line following the question for "s" replace the term "theta" with "phi" as follows:
Replace "Since V_f of 359 kN is less than $0.125\lambda\theta_c f'_c b_w d_v = 439$ kN, then from"
With "Since V_f of 359 kN is less than $0.125\lambda\underline{\phi_c} f'_c b_w d_v = 439$ kN, then from".

Page 11-29 - revise the heading:
"11.4.6 Design of Interior Beam-Column "
to read
"11.4.6 Design of Interior Beam-Column Joint"

Page 11-33 - mid page:
Revise
"Dead loads: self-weight of reinforced concrete members calculated at 24 kN/m^3 "
to read
"Dead loads: self-weight of members calculated at 24 kN/m^3 "

Page 11-34 - in the 1st line under :N-S Direction" revise:
"The calculated period for this structure, using the ….."
to read
"The calculated period for this structure in the N-S direction, using the ….. "

Page 11-35 - in the 1st line under the heading "E-W Direction" revise as follows:
"The calculated period for this structure, using the "

to read
"The calculated period for this structure in the E-W direction, using the "

Page 11-35 -In the sentence preceding the questions for "V" revise
"For the ductile coupled wall system in the N-S direction $R_d = 4.0$ and $R_o = 1.7$."
to read:
"For the ductile coupled wall system in the E-W direction $R_d = 4.0$ and $R_o = 1.7$."

Page 11-37 - Revise:
"11.5.3.4 Check on Structural Irregularity
To determine if the structure is sensitive to torsion, the values of B need to be determined at all levels from the maximum and average displacements of the structure at in the E-W and N-S directions."

to read:

"11.5.3.4 Check on Structural Irregularity
To determine if the structure is sensitive to torsion, the values of B need to be determined at all levels from the maximum and average displacements of the structure ~~at~~ in the E-W and N-S directions. "

Page 11-39 - Revise the heading of Figure 11.23 as follows:
"Figure 11.23 3-D Models used for dynamic analysis "
to read:
"Figure 11.23 3-D Model used for dynamic analysis "

Page 11-46 - in the firs paragraph under 11.5.5.1 revise the reference to "(see Tables 11.10 and 11.11). " to read "(see Tables 11.11 and 11.13). "

Page 11-48 - in the first line following Table 11.14, revise the words "given in Table 11.12, is " to read "given in Table 11.14, is ":

Page 11-50 - at the bottom of the page under heading 11.5.6.3 revise the words:
"In regions of plastic hinging, the uniformly distributed horizontal reinforcement must be anchored within the region of concentrated reinforcement to develop $1.25f_y$ (Clause 21.6.5.5.1). "
to read
"In regions of plastic hinging, the uniformly distributed horizontal reinforcement must be anchored within the region of concentrated reinforcement to develop $1.25f_y$ (Clause 21.6.5.5)."

Page 11-52 - in item "d" following Fig 11.27 in the 3rd line:

Revise the words "The distributed reinforcement ratio must be greater than 0.0025 in each direction. "
to read
"The distributed reinforcement ratio must be <u>at least</u> 0.0025 in each direction. "

Page 11-52 - in Table 11-15 in the 3rd row of the 5th column replace "-18509" with "-17663".

Page 11-54 - revise the equation:

$$\theta_{ic} = \left(\frac{\varepsilon_{cu} \ell_w}{2c} - 0.002 \right) = \left(\frac{0.0035 \times 8.4}{2 \times 0.435} - 0.002 \right) = 0.0278 \le 0.025$$

as follows:

$$\theta_{ic} = \left(\frac{\varepsilon_{cu} \ell_w}{2c} - 0.002 \right) = \left(\frac{0.0035 \times 8.4}{2 \times \underline{0.493}} - 0.002 \right) = \underline{0.0318} \le 0.025$$

Page 11-54 - under the heading "N-S Direction - Ductile Shear Walls (Clause 21.6.7)" revise
"For ductile shear walls, the ratio of the nominal flexural resistance to the factored flexural resistance, M_f, at the base is 1.95 and hence the inelastic rotational demand θ_{id} is taken as:" to read

"For ductile shear walls, the ratio of the nominal flexural resistance to the factored flexural resistance, M_f, at the base is 1.9 and hence the inelastic rotational demand θ_{id} is taken as:"

Page 11-54 - revise equations:

$$\text{“}\theta_{id} = \frac{\left(\Delta_f R_o R_d - \Delta_f \gamma_w \right)}{\left(h_w - \frac{\ell_w}{2} \right)} = \frac{\left(0.028 \times 1.7 \times 3.5 - 0.028 \times 1.9 \right)}{\left(45.0 - \frac{6.4}{2} \right)} = 0.0033 \ge 0.004\text{”}$$

to read

$$\text{“}\theta_{id} = \frac{\left(\Delta_f R_o R_d - \Delta_f \gamma_w \right)}{\left(h_w - \frac{\ell_w}{2} \right)} = \frac{\left(0.028 \times \underline{1.6} \times 3.5 - 0.028 \times \underline{1.95} \right)}{\left(45.0 - \frac{6.4}{2} \right)} = \underline{0.0024} \ge 0.004\text{”}$$

and revise

"$\theta_{ic} = \left(\frac{\varepsilon_{cu} \ell_w}{2c} - 0.002 \right) = \left(\frac{0.0035 \times 6.4}{2 \times 0.303} - 0.002 \right) = 0.0348 \le 0.025$"

to read

"$\theta_{ic} = \left(\frac{\varepsilon_{cu} \ell_w}{2c} - 0.002 \right) = \left(\frac{0.0035 \times 6.4}{2 \times 0.303} - 0.002 \right) = \underline{0.0350} \le 0.025$"

Page 11-54 - In the second line of the second paragraph following heading "11.5.6.5 Checking wall thickness for stability (Clause 21.6.3)" revise:

"a neutral axis depth of 435 mm" to read "a neutral axis depth of 493 mm ".

Page 11-54 - In the 3rd paragraph following heading "11.5.6.5" revise

"…width of the flange of 3100 mm, greatly exceeds $\ell_u / 5$ (see Clause 21.6.3.3)"
to read
"… width of the flange of <u>3200</u> mm, greatly exceeds $\ell_u / 5$ (see Clause <u>21.6.3.5</u>) "

Page 11-55 - under 11.5.6.7 revise:
"(a) Determine probable moment resistances of walls "
to read
"Determine probable moment resistances of walls "

Page 11-56 - revise:

$$V_r = \phi_c \beta \sqrt{f'_c} b_w d_v + \frac{\phi_s A_v f_y d_v \cot\theta}{s}$$
$$= 0.65 \times 0.18 \sqrt{30} \times 400 \times 5120 + \frac{0.85 \times 200 \times 400 \times 5580 \cot 45^\circ}{120}$$
$$= 1312 + 3162 = 4524 \text{kN}$$

to read

$$V_r = \phi_c \beta \sqrt{f'_c} b_w d_v + \frac{\phi_s A_v f_y d_v \cot\theta}{s}$$
$$= 0.65 \times 0.18 \sqrt{30} \times 400 \times \underline{5580} + \frac{0.85 \times 200 \times 400 \times 5580 \cot 45^\circ}{120}$$
$$= \underline{1430} + 3162 = \underline{4592} \text{kN}$$

Page 11-56 - in the 1st paragraph under "E-W Direction" revise:

"with Clause 21.6.8.13 it is necessary to redistribute the shear force "
to read
"with Clause 21.6.8.13 it may be necessary to redistribute the shear force "

Page 11-56 - in the expression for Vr under the heading "E-W Direction" revise the expression as follows:

"$V_r = 0.25\phi_s A_v f_y = 0.25 \times 0.85 \times 28 \times 200 \times 400 = 459\,\text{kN}$"
to read
"$V_r = 0.25\phi_s A_v f_y = 0.25 \times 0.85 \times \underline{27} \times 200 \times 400 = 459\,\text{kN}$"

Page 11.57 - in the first sentence under the heading "N-S Direction" revise the reference to "Clause 11.6.2" to read "Clauses 11.5.1 and 11.5.2"

Page 11-58 - revise the expression for Vr as follows"

Revise

$$v_r = \phi_c\left(c + \mu\left(\rho_v f_y + \frac{N}{A_g}\right)\right)$$

$$= 0.65\left(0.50 + 1.0\left(0.0025 \times 400 + \frac{1017 \times 1000}{800 \times 3200}\right)\right)$$

$$= 1.897\,\text{MPa}$$

Hence, the sliding shear resistance of segment AB is:
$1.897 \times A_{cv} = 1.897 \times 400 \times 3200 = 2429$ kN.

to read:

$$v_r = \phi_c\left(c + \mu\left(\rho_v f_y + \frac{N}{A_g}\right)\right)$$

$$= 0.65\left(0.50 + 1.0\left(0.0025 \times 400 + \frac{\underline{1931} \times 1000}{800 \times 3200}\right)\right)$$

$$= \underline{1.465}\,\text{MPa}$$

Hence, the sliding shear resistance of segment AB is:
$\underline{1.465} \times A_{cv} = \underline{1.465} \times 400 \times 3200 = \underline{1875}$ kN"

Page 11-58 - In the heading to section 11.5.6.10 revise the reference to "Clause 21.6.2" to read "Clause 21.6.5".

Page 11-58 - revise the heading:

"11.5.6.12 Changes in concentrated vertical reinforcement over the height of the walls" to read

"11.5.6.12 Changes in concentrated vertical reinforcement over the height of the walls (Clause 21.6.6)"

Page 11-59 - Immediately following the expression for Vr in section 11.5.7.1 add the following sentence.

"A clear cover of 25 mm and 15M top bars are assumed for the slab."

Page 11-59 - Revise the two equations for Vr as follows:

Revise

"$V_f = [1.0(4.8+1.5)+0.5(2.4)]\times(3.025^2-0.74^2) = 64.5$ kN"

to read

"$V_f = [1.0(4.8+1.5)+0.5(2.4)]\times(\underline{3.125}^2-\underline{0.73}^2) = \underline{69.2}$ kN"

and also revise:

"$v_f = \dfrac{V_f}{b_o d} = \dfrac{64.5\times1000}{2\times(100+550+160/2)\times160} = 0.276$"

to read

"$v_f = \dfrac{V_f}{b_o d} = \dfrac{\underline{69.2}\times1000}{2\times(100+550+160/2)\times160} = \underline{0.296}$ <u>MPa</u>"

Page 11-60 - revise section 11.5.8 to read as follows:

11.5.8.1 Comparisons with the Design Using the 1994 CSA Standard

The structure designed in this section chapter is the same structure designed in Reference 2, except that the structure designed in this section chapter was for a foundation on soil of site Class D (stiff soil), whereas the structure in Reference 2 was for the same structure founded on rock. <u>In addition, 900 mm deep diagonally reinforced coupling beams were used, instead of 600 mm deep coupling beams with conventional reinforcement.</u> It is noted that, for this structure, the design force levels using the 2005 NBCC are somewhat lower than those using the 1995 NBCC.

SECTION 2
Errata for Hard Cover 3rd Edition 1st Printing
And Soft Cover 3rd Edition

Note: Identification of 1st Printing: Both the first and second printing of the 3rd edition Hard Cover were erroneously identified on page "ii" as "First Printing January 2006". The second printing can be identified by the presence of two figures, "6.1" and "6.1(a)" on page 6-37, while the first printing will show only one figure "6.1" on this page. Figure 6.1(a) is included in the errata below.

Page 220 - n Table N3.1.3 in the last row under the column titled "AREA", replace "2000" with "2500".

Page 244 - in Note N10.15.3 in the 3rd line – revise "C_mM_2" to read "M_2"

Page 278 – Note N12.15.1 in the second line replace "Table 12-2" with "Clause 12.15.2".

In the 4th line of the same note replace "The classifications for Table 12-2 require" with " Clause 12.15.2 requires".

Page 278 – Note 12.15.4. In the second line replace "1.25" with 1.20".

Page 1-15 – At the bottom of the page in the last sentence replace "550" with "500" and replace "Clause 9.4.1" with "Clause 8.5.1".

Page 1-33 – In the expression for "R" replace:

"$R = \frac{300}{100x0.9}$" with "$R = \frac{300}{100 \times 0.9} - 1 = 2.33\ hours$"

Page 1-37 – Replace the text below as indicated:
Replace:

"(Clear side cover at CGS = " $\frac{99.1 - 90}{2} = 43.2$"

with

"(Clear side cover at CGS = $\frac{99.1 - 12.7}{2} = 43.2$"

Page 1-73 – In the right hand column in the second row, replace the second half of the expression for "I" as indicated below: Replace

"$-\frac{R^2}{4}\left[y_1\sqrt{R^2 - y_1^{\,2}} + R^2 \sin^{-1}\right]\frac{y_1}{R}$"

with

"$-\frac{R^2}{4}\left[y_1\sqrt{R^2-y_1{}^2}+\underline{R^2\sin^{-1}}\frac{y_1}{R}\right]$"

Page 2-13 – Replace the text below as indicated: (An "=" sign was missing in line 2, and square root signs were missing in lines, 4, 7, 10 and 11).

5. Check minimum steel requirement:

$M_r\ 1.2\ M_{cr}$

$M_r = 415\ kN\cdot m\ \ for\ 5-25M\ bars$

$M_{cr} = 0.6\,\lambda\,\mathrm{f_c}'\,I_c / c_t \qquad (Eq.2-5\ and\ 2-6)$

$I = bh^3/12 = (400)(600)^3/12 = 7.2\cdot 10^9\ mm^4$

$c_t = 600/2 = 300\ mm; \quad \lambda = 1.0\ (normal\ density\ concrete)$

$M_{cr} = 0.6\ (1.0)\ 40\ (7.2\cdot 109)/(300) = 91\cdot 106\ N\cdot mm$

$M_r = 415\ kN\cdot m > 1.2(91) = 109\ kN\cdot m \quad OK$

$Note: Eq\ 2-7\ may\ be\ used\ in\ lieu\ of\ Eq2-5.$

$A_{s\min} = 0.2\,\mathrm{f_c}'\,b_t h / f_y \quad (Eq.2-7)$

$A_{s\min} = 0.2\ \ (40)\ (400)\,(600)/(400) = 759\ mm^2$

$A_s = 5(500) = 2500 > 759\ mm^2\ \ OK$

Replace with:

5. Check minimum steel requirement:

$M_r = 1.2\ M_{cr}$

$M_r = 415\ kN\cdot m\ \ for\ 5-25M\ bars$

$M_{cr} = 0.6\,\lambda\,\underline{\sqrt{\mathrm{f_c}'}}\,I_c / c_t \qquad (Eq.2-5\ and\ 2-6)$

$I = bh^3/12 = (400)(600)^3/12 = 7.2\cdot 10^9\ mm^4$

$c_t = 600/2 = 300\ mm; \quad \lambda = 1.0\ (normal\ density\ concrete)$

$M_{cr} = 0.6\ (1.0)\ \underline{\sqrt{40}}\ (7.2\cdot 109)/(300) = 91\cdot 106\ N\cdot mm$

$M_r = 415\ kN\cdot m > 1.2(91) = 109\ kN\cdot m \quad OK$

$Note: Eq\ 2-7\ may\ be\ used\ in\ lieu\ of\ Eq2-5.$

$A_{s\min} = 0.2\underline{\sqrt{f_c'}}\ b_t\ h / f_y \quad (Eq.2-7)$

$A_{s\min} = 0.2\,\underline{\sqrt{40}}\,(400)\,(600)/(400) = 759\ mm^2$

$A_s = 5(500) = 2500 > 759\ mm^2\ \ OK$

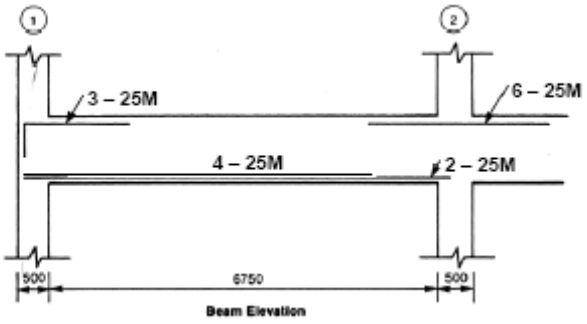
Page 2-20 - At the top of the page in the numerator of the expression for "K_r" replace "$\phi_c f_y$" with "$\phi_s f_y$".

Page 2-23 – Revise equation (2.2) as noted below:
Replace "$\alpha_1 = 0.97 - 0.0025 f_c' \geq 0.67$" with "$\beta_1 = 0.97 - 0.0025 f_c' \geq 0.67$

Page 5-2 – At the top of the even numbered pages in Chapter 5 replace the heading "Short Columns" with "Slabs".

Page 5-13 – In the table of design moments, in the 1st row of the 3rd column replace "156" with "160". Also in the 1st row of the 4th column replace "198" with "185".

Page 6-6 – Revise the figure as shown below. Extend the shorter of the two bottom bars to the end of the span on the left hand side as indicated below.



Page 6-11 – At the bottom of the page, at the end of the second sentence following the heading "Design Example 6.2", add the text noted below:

"Required: Deflection calculations for two-way slab systems with drop panels. Calculations based on specified loads and $f_r = 0.3\sqrt{f_c'}$ MPa. (See figue 6.1(a)). "

Page 6-37 – Figure 6.1(a) shown below was inadvertently omitted from this page. Insert Figure 6.1(a) below Figure 6.1 on page 6-37.

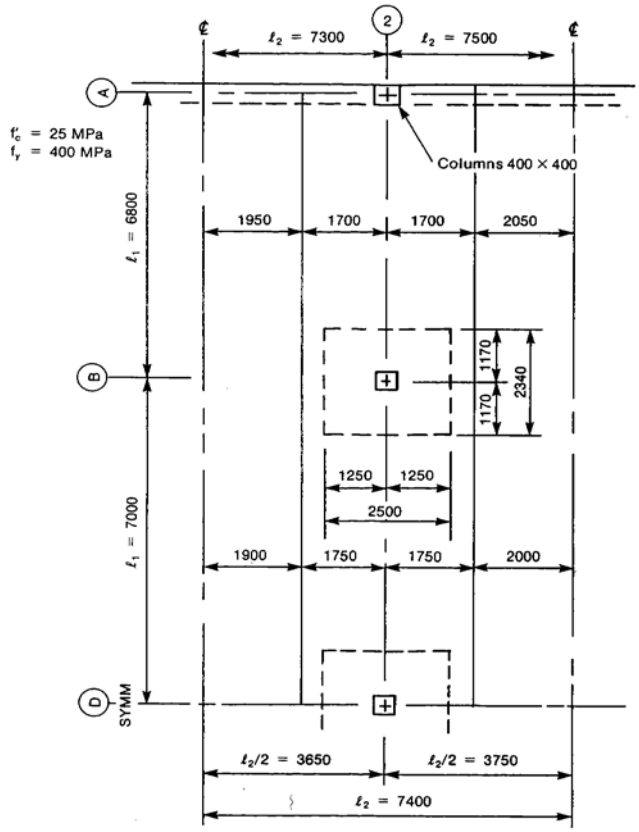


Fig. 6.1(a)

Page 8-3 – In section 8.2.2 in the 10 line replace "0.5" with "1.0".

Page 8-7 - Revised both the 4th line on this page and equation 8.9 as follows:

"Furthermore, the <u>moment</u> ~~C_m~~ M_2 should not be less than the moment associated with minimum eccentricity."

"~~C_m~~ $M_2 = P_f(15 + 0.03h)$ (8.9)"

Page 8-10 – In Step 5 of Example 8-1 revise the text as follows:
Revise:
"Alternatively, EI from Eq 8.7;
EI = 0.25 EcIg = 0.25 x 29602 x 5.2 x 109 = 3.8 x 1013 N.mm^2 "
With
"Alternatively, EI from Eq 8.7 for β_d = 0.53;
EI = <u>0.26</u> EcIg = <u>0.26</u> x 29602 x 5.2 x 109 = <u>4.0</u> x 1013 N.mm^2 "

Page 8-10 – In the last line on this page delete the term "C_m " at the start of the line.

Page 8-13 – In step 3 of Example 8-2 replace the text as follows:

Replace:

"Note: Pc for all load combinations can be computed to be the same if Eq. 8.7 is used in computing EI, since this expression is independent of β_d.

Ec = 29602 MPa for f'c = 40 MPa (from Table 8.4)

From Eq. 8.7; EI = 0.25 EcIg = 0.25 (29602)(5.2 x 109) = 3.8 x 1013 N.mm^2

ℓu = 5500 - 750 = 4750 mm "

with

"Use Eq. 8.7 for simplicity, with β_d = 0.0 for sidesway effects (since the wind induced shear is not a sustained load) and an assumed value of β_d = 0.6 for braced frame effects. Ec = 29602 MPa for f'c = 40 MPa (from Table 8.4)

From Eq. 8.7;

for sway frames; EI = 0.4 E_cI_g = 0.4 (29602)(5.2 x 109) = 6.2 x 1013 N.mm^2

for braced frames; EI=0.4E_cI_g /(1+β_d)=0.25(29602)(5.2 x109)=3.8x1013 N.mm^2

l_u = 5500 - 750 = 4750 mm "

Page 8-13 – In the first line of step 3(i) replace:

"$P_c = \pi^2 EI / (k\ell_u)^2 = \pi^2$ (3.8 x 10^{13})/(1.35 x 4750)^2 = 9,121 x 10^3 N for a sway frame. "

with

"$P_c = \pi^2$ EI / (k l_u)^2 =π^2 (6.2 x 10^{13})/(1.35 x 4750)^2 = 14,881 x 10^3 N for a sway frame. "

Page 8-13 – In the first line of step 3(ii) replace:

"$P_c = \pi^2 EI / (k\ell_u)^2 = \pi^2$ (3.8 x 10^{13}) / (1.15 x 4750) ^{2} = 12,569 x 10^3 N for a sway frame. "

with

"$P_c = \pi^2$ EI / (k l_u)^2 = π^2 (6.2 x 10^{13}) / (1.15 x 4750)^2 = 20,507 x 10^3 N for a sway frame. "

Page 8-14 – In step 4(i)(a) at the top of the page, revise the text below as indicated. The revisions are underlined.

Replace

"a) Sway magnification factor δ_s from Eq. 8.12.

ΣPf = 4 (2359 + 18) + 10 (3375 + 26) + 6 (5287 + 6) = 75276 kN

From Step 3; ΣPc = 10 (9121) + 10 (12569) = 216900 kN

δ_s = 1 / [1 - ΣPf / (ϕ_m ΣPc)] = 1 / [1 - 75276 / (0.75 x 216900)] = 1.86

δ_s M_{1s} = 1.86 x 43 = 80 kN.m

δ_s M_{2s} = 1.86 x 63 = 117 kN.m

b) Compute design moments M_1 and M_2 from Eqs. 8.10 and 8.11, and Table 8.7.

$M_1 = M_{1ns} + \delta_s M_{1s}$ = 226 + 80 = 306 kN.m

$M_2 = M_{2ns} + \delta_s M_{2s}$ = 239 + 117 = 356 kN.m "

With

"a) Sway magnification factor δs from Eq. 8.12.

ΣP_f = 4 (2359 + 18) + 10 (3375 + 26) + 6 (5287 + 6) = 75276 kN
From Step 3; ΣPc = 10 (14881) + 10 (20507) = 353880 kN
δs = 1 / [1 - 3Pf / ($\phi m \Sigma Pc$)] = 1 / [1 - 75276 / (0.75 x 353880)] = 1.40
$\delta s\ M_{1s}$ = 1.40 x 43 = 60 kN.m
$\delta s\ M_{2s}$ = 1.40 x 63 = 88 kN.m

b) Compute design moments M_1 and M_2 from Eqs. 8.10 and 8.11, and Table 8.7.
$M_1 = M_{1ns} + \delta s\ M_{1s}$ = 226 + 60 = 286 kN.m
$M_2 = M_{2ns} + \delta s\ M_{2s}$ = 239 + 88 = 327 kN.m "

Page 8-14 – In step 4(ii)(a) Revise the text as indicated. Revisions are underlined.

Revise
"a) Sway magnification factor δ_s and magnified sway moments $\delta_s\ M_{1s}$ and $\delta_s\ M_{2s}$
ΣPf = 4 (1850 + 64) + 10 (2646 + 91) + 6 (4143 + 21) = 60010 kN
From Step 3: ΣPc = 10 (9121) + 10 (12569) = 216900 kN
$\delta_s = 1 / [1 - \Sigma Pf / (\phi_m \Sigma Pc)] = 1 / [1 - 60010 / (0.75 \times 216900)] = 1.58$
$\delta_s\ M_{1s} = 1.58 \times 152 = 240$ kN.m
$\delta_s\ M_{2s} = 1.58 \times 220 = 348$ kN.m

b) Compute design moments M_1 and M_2 from Eqs. 8.10 and 8.11, and Table 8.7.

$M_1 = M_{1ns} + \delta_s\ M_{1s} = 177 + 240 = 417$ kN.m
$M_2 = M_{2ns} + \delta_s\ M_{2s} = 188 + 348 = 536$ kN.m "

with

"a) Sway magnification factor δ_s and magnified sway moments $\delta_s\ M_{1s}$ and $\delta_s\ M_{2s}$

ΣP_f = 4 (1850 + 64) + 10 (2646 + 91) + 6 (4143 + 21) = 60010 kN

From Step 3; ΣP_c = 10 (14881) + 10 (20507) = 353880 kN
$\delta_s = 1 / [1 - \Sigma P_f / (\phi_m \Sigma P_c)] = 1 / [1 - 60010 / (0.75 \times 353880)] = 1.29$
$\delta_s\ M_{1s} = 1.29 \times 152 = 196$ kN.m
$\delta_s\ M_{2s} = 1.29 \times 220 = 284$ kN.m

b) Compute design moments M_1 and M_2 from Eqs. 8.10 and 8.11, and Table 8.7.

$M_1 = M_{1ns} + \delta_s\ M_{1s} = 177 + 196 = 373$ kN.m
$M_2 = M_{2ns} + \delta_s\ M_{2s} = 188 + 284 = 472$ kN.m "

Page 8-15 – In step 4(i)(a) Revise the text as indicated. The revised numbers are underlined.

Revise
"ΣP_f = 4 (1788) + 10 (2555) + 6 (4000) = 56702 kN
From Step 3; ΣP_c = 10 (9121) + 10 (12569) = 216900 kN

$\delta_s = 1 / [1 - \Sigma P_f / (\phi_m \Sigma P_c)] = 1 / [1 - 56702 / (0.75 \times 216900)] = 1.54$

$\delta_s = 1.54 < 2.5$ O.K. "

with

"$\Sigma P_f = 4 (1788) + 10 (2555) + 6 (4000) = 56702$ kN
From Step 3; $\Sigma P_c = 10 (\underline{14881}) + 10 (\underline{20507}) = \underline{353880}$ kN

$\delta_s = 1 / [1 - \Sigma P_f / (\phi_m \Sigma P_c)] = 1 / [1 - 56702 / (0.75 \times \underline{353880})] = \underline{1.27}$

$\delta_s = \underline{1.27} < 2.5$ O.K. "

Page 8-16 – At the top of the page revise the text as indicated. The revised numbers are underlined.

Revise

"$\Sigma P_f = 4 (2359) + 10 (3375) + 6 (5287) = 74908$ kN
From Step 3;
$\Sigma P_c = 10 (9121) + 10 (12569) = 216900$ kN

$\delta_s = 1 / [1 - \Sigma P_f / (\phi_m \Sigma P_c)] = 1 / [1 - 74908 / (0.75 \times 216900)] = 1.85$
$\delta_s = 1.85 < 2.5$ O.K. "

with

"$\Sigma P_f = 4 (2359) + 10 (3375) + 6 (5287) = 74908$ kN
From Step 3;
$\Sigma P_c = 10 (\underline{14881}) + 10 (\underline{20507}) = \underline{353880}$ kN

$\delta_s = 1 / [1 - \Sigma P_f / (\phi_m \Sigma P_c)] = 1 / [1 - 74908 / (0.75 \times \underline{353880})] = \underline{1.39}$
$\delta_s = \underline{1.39} < 2.5$ O.K."

Page 8-16 – In the right hand column of the Summary of Design Loads table revise the "356" to read "$\underline{327}$" and revise "536" to read "$\underline{472}$".

Page 8-16 – Revise the text below the table as shown below:

Revise

"Select the interaction diagrams given in Table 7.4.15 from Chapter 7.
For Load Combination II;
$P_f/A_g = 2737 \times 10^3 / (500)^2 = 11.0$ MPa
$M_f/A_g h = 536 \times 10^6 / (500)^3 = 4.3$ MPa
Select $\rho_t = 0.02$. $A_{st} = 0.02 (500)^2 = 5000$ mm^2. Try 30M bars ($A_{st} = 700$ mm^2);
5000 / 700 = 7.14. Use 8 - 30M bars equally distributed on all four faces.

Check the capacity for Load Combination I;
$P_f/A_g = 3401 \times 10^3 / (500)^2 = 13.6$ MPa
$M_f/A_g h = 356 \times 10^6 / (500)^3 = 2.8$ MPa
the point lies inside the interaction diagram, O.K.
Note: For further details of cross-sectional design refer to Chapter 7."

with

"Select the interaction diagrams given in Table 7.4.14 and 7.4.15 from Chapter 7 and interpolate for γ =375/500 = 0.75.
For Load Combination II;
P_f/A_g = 2737 x 10^3 / $(500)^2$ = 11.0 MPa
M_f/A_gh = 472 x 10^6 / $(500)^3$ = 3.8 MPa

From Table 7.4.14 for γ = 0.70; select ρ_t = 0.017.
From Table 7.4.15 for γ = 0.80; select ρ_t = 0.015.
Interpolate for γ = 0.75; ρ_t = 0.016.
A_{st} = 0.016 $(500)^2$ = 4000 mm^2. Try 25M bars (A_{st} = 500 mm^2);
4000 / 500 = 8.0; Use 8 -25M bars equally distributed on all four faces.

Check the capacity for Load Combination I;
P_f/A_g = 3401 x 10^3 / $(500)^2$ = 13.6 MPa
M_f/A_gh = 327 x 10^6 / $(500)^3$ = 2.6 MPa
the point lies inside both interaction diagrams, O.K.
Note: For further details of cross-sectional design refer to Chapter 7. "

Page 8-20 – In the the 2nd column of Table 8.4 move the bottom number "5,771" down one line to line up with the remainder of the numbers in that row.

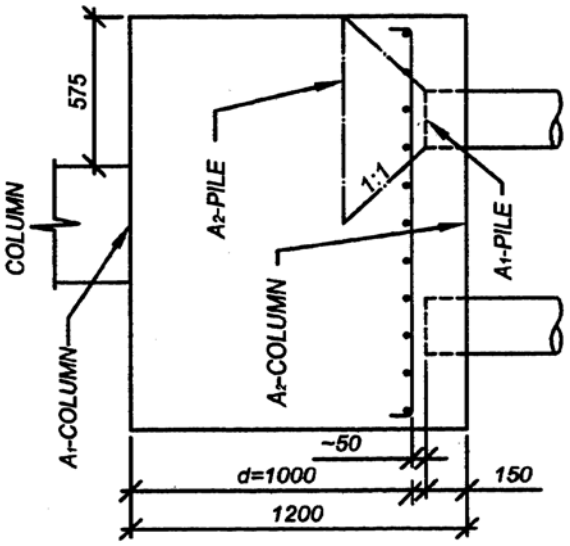
Page 9-4 – In Figure 9.1 add the word "Factored" in front of the three designations currently listed as, "Surcharged Load –W_1", "Soil Weight – W_2" and "Footing Self Weight – W_3" on the right hand side.

Page 9-33 – In the second last line before step 3 on this page revise the second "=" sign with "≈" as noted below:

"Pile cap total depth is $h = 1000 + 30$ (bar diameter) $+ 150 \approx 1200$ mm. This pile cap is"

Page 9-35 – In Figure 9.7.8.1(b) revise the dimension "d=100" to read "d". Also above the designation that reads "C_5 = COMPRESSIVE STRUT FOR PILE 5", add the following text:
"d = 1200-150-a/2 = 1050 –(≈30) = 1020
thus use 1000 mm"

Page 9-35 – In Figure 9.7.8-1(a) in the bottom right hand corner of the right hand figure, revise the dimension "d = 1000" to run from the top of the pile cap to the level of the reinforcement, rather than to the top of the pile as is currently indicated. See revised Figure 9.7.8-1(a) below:



Page 9-40 - in the third line under the top figure replace "For circular polgonal……" with "For circular polygonal……", and in the 6th line under the figure replace "aspect rations" with "aspect ratios".

Page 9-48 – Revise the second line of the "Note to Tables 9.4 to 9.6" with the following text:
"the Handbook. Thus for the given q_{sf} and A_f/A_c initial design parameters a d/h_e ratio is calculated based on Equation "

Page 10-43 – In the 6th line on this page revise "Clause 16.1.3" to read "CSA A23.4".

Page 10-52 – In the table at the bottom of the page revise the second last row of numbers in columns 3 through 6 as follows:

Replace "40.7 -268.0 -259.0 -238.0" with " -41.6 -264.0 -254.0 -233.5".

In the last row of the same table replace "164.0" with "168.0"

Page 10-53 – In the 4th line on this page revise
" $min\, A_s = 0.0006 h_s / l_n = 0.0006 \cdot 170 \cdot 6600 = 673\ \text{mm}^2$ "
to read
" $\min A_s = 0.0006 h_s\ l_n = 0.0006 \cdot 170 \cdot 6600 = 673\ \text{mm}^2$ "

Page 10-54 – In the last line of section 9.3.2 revise
" $2 \cdot 130 \cdot 465 (\frac{1}{2} 465 + 148)^2 = 4.72 \cdot 10^9\ \text{mm}^4$ "
to read

"$2 \cdot 130 \cdot 465(\frac{1}{2}465 - 148)^2 = 4.72 \cdot 10^9 \text{ mm}^4$ "

Page 10-55 – In the 9th line revise

" $s \le \frac{71}{078} = 91 \text{ mm}$ " to read " $s \le \frac{71}{\underline{0.78}} = 91 \text{ mm}$ "

Page 10-56 – In the 3rd line revise:

" $\gamma_v = \frac{1}{1 + \frac{2}{3}\left(\frac{965}{1530}\right)^{1/2}} 0.346$ "

to read

" $\gamma_v = 1 - \frac{1}{1 + \frac{2}{3}\left(\frac{965}{1530}\right)^{1/2}} = 0.346$ "

Page 10-56 – In the last line at the bottom of the page replace
"M_f = 348.7 - 329.5 = 19.2 kN·m" with "M_f = <u>320.9 – 306.9 = 14.0</u> kN·m"

Page 10-57 – Five lines down from the top of the page revise the expression for "v_f " as follows.

Revise $v_f = \frac{557\left(10^3\right)}{275\left(10^3\right)} + \frac{0.40(19.2)10^6\,(530/2)}{13.10\left(10^9\right)} = 2.02 + 0.15 = 2.17 \text{ MPa}$

To read:

$$v_f = \frac{557\left(10^3\right)}{275\left(10^3\right)} + \frac{0.40\underline{(14.0)}10^6\,(530/2)}{13.10\left(10^9\right)} = 2.02 + \underline{0.12} = \underline{2.14} \text{ MPa}$$

Page 10-58 – In the 6th line down from the top of the page replace "2.17 MPa" with "<u>2.14</u> MPa".

Page 11-51 – In the 4th line on this page revise "must be greater than 0.0025" to read "must be <u>at least</u> 0.0025".

Page 13-8, Section 13.3.1

Change:

$$I_{cr} = \frac{b(kd)^3}{3} + \frac{E_s A_s (kd - c)^2}{E_c}$$

To:

$$I_{cr} = \frac{b(kd)^3}{3} + \frac{E_s A_s (d - kd)^2}{E_c}$$

Page 13-10, Section 13.4.2

Change:
Cp Cg = Combined exterior pressure/gust coefficient. Values in the order of + 1.3 or – 0.5
To:
Cp Cg = Combined exterior pressure/gust coefficient. Values in the order of + 1.3 or – <u>1.5</u>
Change:
From Figure I–5 in the NBCC Commentaries:
To:
From Figure <u>I–8 </u>in the NBCC Commentaries:

Page 13-16, Section 13.10

Change:

$$M_f = M_b + \frac{W_c \Delta}{3} = \frac{W_c}{3} \frac{M_f l_c^2}{4 E I}$$

To:

$$M_f = M_b + \frac{W_c \Delta}{3} = \underline{M_b +} \frac{W_c}{3} \frac{M_f l_c^2}{4 E I}$$

Page 13-37, Design Example 13.3

Change:

$$I_{cr} = \frac{b(kd)^3}{3} + \frac{E_s A_s (kd - c)^2}{E_c} = \frac{1250 \times 38.5^3}{3} + \frac{200\,000 \times 1400 (120 - 38.5)^2}{24\,650}$$
$$= 99.2 \times 10^6 \text{ mm}^4$$

To:

$$I_{cr} = \frac{b(kd)^3}{3} + \frac{E_s A_s (\underline{d - kd})^2}{E_c} = \frac{1250 \times 38.5^3}{3} + \frac{200\,000 \times 1400 (120 - 38.5)^2}{24\,650}$$
$$= 99.2 \times 10^6 \text{ mm}^4$$

SECTION 3

ERRATA For The Hard Cover 3rd Edition, 1st and 2nd Printing, and the Soft Cover 3rd Edition Handbook

Identification of 2nd Printing: The second printing of the 3rd edition Hard Cover was erroneously identified on page "ii" as being "First Printing January 2006". It should have read "Second Printing". The second printing can be identified by the presence of two figures, "6.1" and "6.1(a)" on this page, while the first printing has only 1 figure "6.1" on this page.

Page 310 – In Figure N18.3.3 revise the definition of "Δ_1" as follows:

"Δ_1 = downwards deflection due to live load."

Page 313 – Revise Figure N18.6.2(b) to indicate the "unbonded" condition as pertaining to the dashed horizontal line. See revised Figure N18.6.2(b) below:

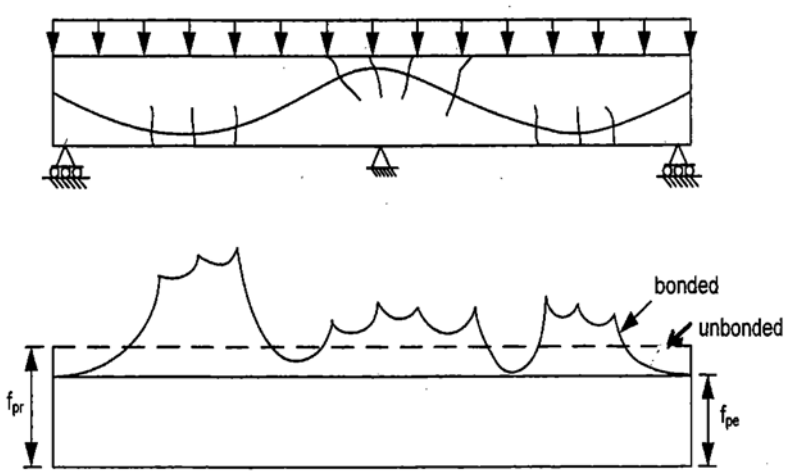


Fig. N18.6.2(b)
Tendon Stress Variation

Page 1-59- In the middle of the page under "Simple Beam – load increasing uniformly to one end" - in the denominator of the expression for V_x revise "3" to read "6".

Page 1-61 – At the bottom of the page for "Beam fixed at both ends – uniform load partially distributed" in the expressions for both $R_1=V_1$ and $R_2 = V_2$, revise the term "wc" to read "wb".

Page 2-8 – In the numerator of equation "2.24" at the bottom of the page, revise the term "ϕ_c" to read "ϕ_s".

Page 2-9 – In the denominator of equation 2.29 revise the term "$\varnothing_c$" to read "$\varnothing_s$".

Page 8-7 – In equation (8.8) replace "06" with "0.6".

Page 8-13 – In step 3 in the middle of the page revise the text as follows:

Revise "Note: Pc for all load combinations can be computed to be the same if Eq. 8.7 is used in computing EI, since this expression is independent of βd. "

To read

"Note: Pc for all load combinations can be computed to be the same if βd is assumed to be 0.6 and Eq. 8.7 is used in computing EI ."

Page 9-32 – In figure 9.7.7-3 label the lower figure as "b) TWO-WAY SHEAR" rather than "a) TWO-WAY SHEAR" as is currently written.

Page 10-14 – Revise equation (10.5.14) as follows:

Revise "$n\frac{A_sE_s + A_pE_p}{E_cbd}$" to read "$n\rho\frac{A_sE_s + A_pE_p}{E_cbd}$"

Page 10-14 – Revise equation (10.5.15) as follows:

Revise "$k^3p - 3k^2(p-1) - 6n\rho(1-k) - (1-\alpha_b)(k-\alpha_f)(kp + 2p\alpha_1 - 3p + 3) = 0$"

to read "$k^3p - 3k^2(p-1) - 6n\rho(1-k) - (1-\alpha_b)(k-\alpha_f)^2(kp + 2p\alpha_{\underline{f}} - 3p + 3) = 0$"

Page 10-16 – In the equation for c/d_p at the top of the page revise change "f_{pr}" in the numerator to "$f_{\underline{pu}}$". See below:

Revise: "$\frac{c}{d} = \frac{\phi_p A_p f_{pr} + \phi_s A_s f_s - \phi_s A_s' f_s' - \alpha_1 \phi_c f_c' h_f (b - b_w)}{\alpha_1 \phi_c f_c' \beta_1 b_w d_p + \phi_p k_p A_p f_{pu}}$"

to read

"$\frac{c}{d} = \frac{\phi_p A_p \underline{f_{pu}} + \phi_s A_s f_s - \phi_s A_s' f_s' - \alpha_1 \phi_c f_c' h_f (b - b_w)}{\alpha_1 \phi_c f_c' \beta_1 b_w d_p + \phi_p k_p A_p f_{pu}}$"

Page 10-17 – At the top of the page delete "$\phi_c\phi_c$" in the expression for "f_r".

Page 10-46 – Insert the text "Fig. 10.8.1" immediately below the figure on page 10-46.

In the 2nd last line on the page replace "W_{LF} = 1.50 (2.3 " with "W_{LF} = 1.50 (2.3)".

APPENDIX "A"

A subject index for the CSA A23.3-04 Standard was not included in the 3rd Edition of the CAC Concrete Design Handbook. In response to user requests for the Index, it has been regenerated and included here for your information.

The Index traditionally followed the CSA A23.3 Explanatory Notes section of the Handbook. In the 3rd Edition the Notes section ends on page 358 of the tan coloured pages.

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