2006 IBC Structural/Seismic Design Manual, Volume 1

Errata Changes to First Printing. This errata supersedes all previous errata.

EDITORIAL CHANGES – FIRST PRINTING

Page 37, Number 2, first equation now reads . . . $F_a = 1.43$

Page 78, Under Calculations and Discussion, Number 1, Equation 12.8-7, line 1 now reads . . . = 0.75 sec

Page 166, Number 2, Equation 12.11-1, line 1, now reads . . . $F_p = 0.8(1.0)(1.0)w_p = 0.8w_p = 0.8(1400)$

Errata Changes to First, Second Printing

Page 33, third line from the bottom should read:

$= -0.968D + 0.75\,L_r - 0.525\,Q_E$ for D and Q_E with the opposite sense

Page 37, Number 1 values should read:

$S_S = 46.2\%g = 0.573g$

$S_1 = 20.3\%g = 0.230g$

Page 37, Number 2, first sentence and T 11.4-1 should read:

From the USGS for the given site class D, and $S_S = 0.573g$, $S_1 = 0.230g$, the site coefficients are as follows

$F_a = 1.43$ T 11.4-1

Page 37 Eq 11.4-1 should read: $S_{MS} = F_a S_s = 1.43(0.573g) = 0.819g$

Page 37 Eq 11.4-2 should read: $S_{M1} = F_v S_1 = 1.99(0.230g) = 0.458g$

Page 38 Number 3 should read:

$$S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3}(0.819g) = 0.546g \qquad \text{(Eq 11.4-3)}$$

$$S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3}(0.458g) = 0.305g \qquad \text{(Eq 11.4-4)}$$

Page 38 Number 4 Equation 11.4-6 should read:

$S_a = (S_{D1}) / T$ (Eq 11.4-6)

Where: $T_o = 0.20 (S_{D1} / S_{DS})$

$= 0.2 (0.305 / 0.546)$

$= 0.11$ sec

$T_s = S_{D1} / S_{DS}$

$= 0.305 / 0.546$

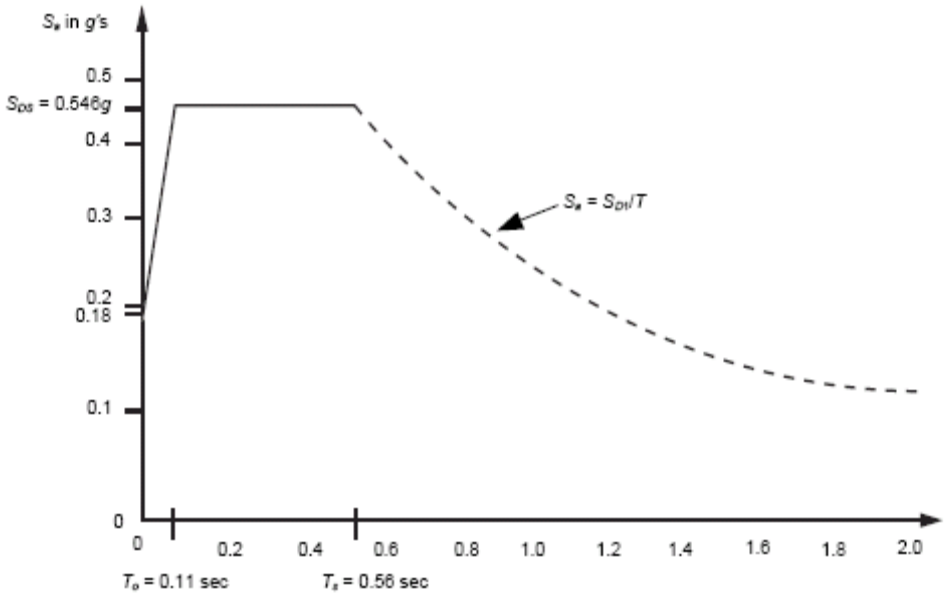
$= 0.56$ sec

Page 39, top of page should read:

Thus:

T = Period	S_a/g	Computation for S_a
0.00	0.18	0.4 (0.44)
0.11	0.546	0.44
0.56	0.546	0.30 / 0.55
0.80	0.38	0.30 / 0.8
1.00	0.30	0.30 / 1.2
1.20	0.25	0.30 / 1.4
1.40	0.22	0.30 / 1.6
1.60	0.19	0.30 / 1.8
2.00	0.15	0.30 / 2.0

General Procedure Response Spectrum should read:



General Procedure Response Spectrum

Page 40, Number 5 should read:

$C_s = S_{DS} / (R/I)$ (Eq 12.8-2)

$= 0.546 / (6.0/1.0)$

$= 0.091$ . . . Governs

The value of C_s need not exceed

$C_s = S_{D1} / (R/I)\ T$ (Eq 12.8-3)

$= 0.30 / (6.0/1.0)\ (0.6)$

$= 0.085$

Page 40, Number 5 last Equation should be numbered (Eq 12.8-6) as follows:

$C_s = 0.5S_1 / (R/I)$ (Eq 12.8-6)

Page 59, under first text paragraph, change to read as follows:

$\delta_{L,2} = 1.20$ in $\quad \delta_{R,2} = 1.90$ in

$\delta_{L,1} = 1.00$ in $\quad \delta_{R,1} = 1.20$ in

Page 61, (IBC Eq 16-44) Line 3 change to read as follows:

$$\delta_{avg} = \frac{\delta_{L,2} + \delta_{R,2}}{2} = \frac{1.30 + 1.90}{2} = 1.60 \text{ in}$$

Page 69, second sentence from the bottom should read:

the conditions listed below is met. In all other conditions, ρ is taken as 1.3.

Page 70, second sentence of first paragraph should read:

in the summary of Table 12.3-3) will not result in more than a 33-percent reduction in

Page 70, Condition I, 5. first sentence, delete the word isolated and replace with damped.

Page 72, top of page Figure 15-2 should read:

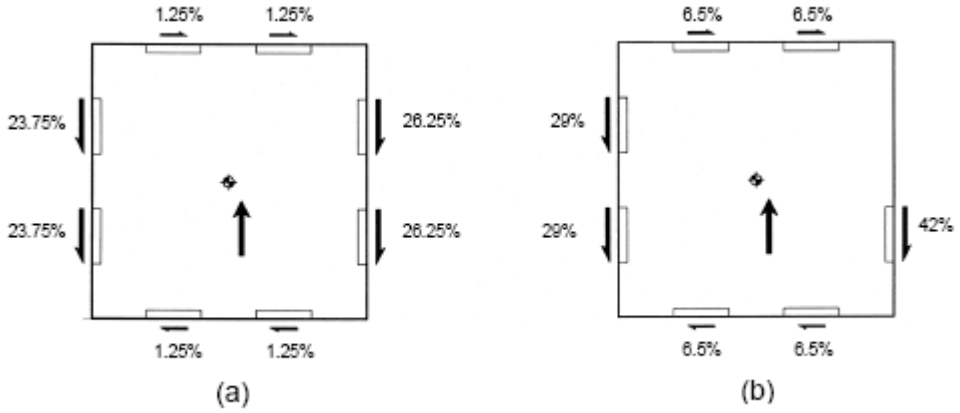


Figure 15-2

Page 72, bottom of page Figure 15-3 should read:

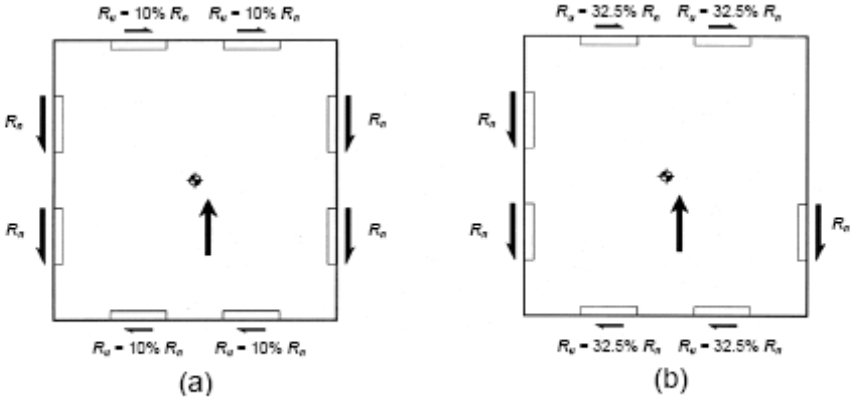


Figure 15-3

Page 81, number 2, first paragraph, beginning with the seventh line should read:

geometric irregularity (Table 12.3-2) and dynamic analysis is required for this type of irregularity per Table 12.6-1.

Page 81, number 3, text after the heading should read:

EBF structures use the $C_t = 0.03$ and $x = 0.75$.

Page 90, second paragraph, last line, change Occupancy Category to II.

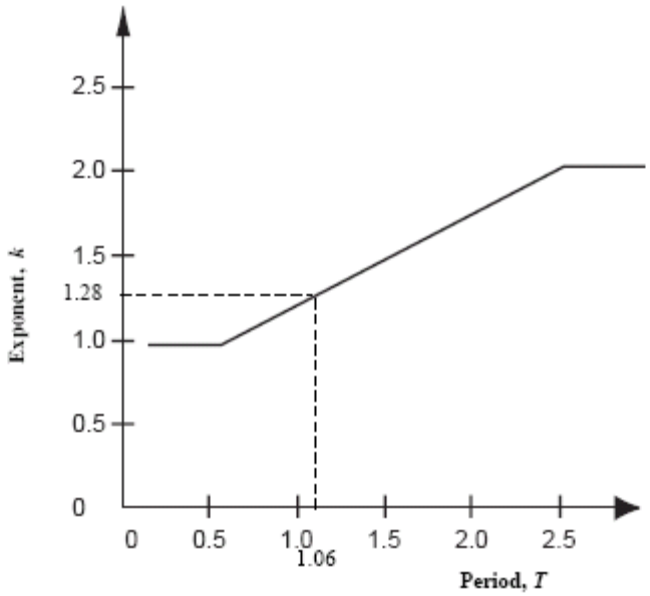
Page 92, second paragraph, last line, change Seismic Use Group I to read Occupancy Category II.

Page 94, Number 2, last equation after Thus should read:

$$F_x = \frac{233.2 w_x h_x^k}{\sum_{i=1}^{9} w_i h_i^k}$$

Page 94, Number 3 bottom figure should read:

Thus:



Page 95, last paragraph at bottom of page, third sentence from the bottom, delete last two words "stress checking" and replace with "designing".

Page 96, Paragraph should read:

Structures that have a vertical irregularity of Type 1a, 1b, 2, or 3 in Table 12.3-2, or horizontal irregularities of Type 1a or 1b in Table 12.3-1, may have significantly different force distributions. Structures with long periods, e.g., T > $3.5T_s$, require a dynamic analysis per Table 12.6-1 in Seismic Design Categories D, E, or F. In addition, some Irregular Structures require a dynamic analysis per Table 12.6-1. The configuration and final design of this structure must be checked for irregularities. Most structural analysis programs used today perform this calculation, and it is rarely necessary to manually perform the calculations shown above. However, it is recommended that these calculations be performed to confirm the computer analysis and to gain insight to structural behavior. Note that $(\overline{S_a})_{max}$ is approximately twice C_s, and $\overline{S_a} = \Gamma \phi S_a$ from a modal analysis.

Page 97, Bottom of the page insert the directional arrow to indicate North.

Page 98, under Number 1, third equation should read:

$$y_R = \frac{R_C(40\text{ ft})}{R_C + R_D} = 20\text{ ft}$$

Page 100, Last equation on page should be identified as 12.8-14 not IBC Eq 16-44.

Page 103, Heading of Table should read:

	Force F_x Position		
	$\overline{X}_{cg}$	$\overline{X}_{cg} - e_{acc}$	$\overline{X}_{cg} + e_{acc}$

Page 104, middle of page, second equation under "the average story displacement is computed as" delete the units in the answer. The answer should be 1.19.

Page 107, last line, answer should be = -84.5 kips tension

Page 115, first line, answer should be = 71 kips

Page 115, Number 3, equations and text should read:

$$P = 1.2D + 0.5L + E \qquad \text{§2.3.2 (Comb. 5)}$$

$$= 1.2(50) + 0.5(30) + 40 + 0.2(1.0)(50) = 125\text{k}$$

A uniform pressure of 125k/27.6 sf = 4.53 ksf should be used to determine the internal forces of the footing. (Note that if the footing also resisted moments, the pressure would not be uniform.)

The other seismic load combination is

$$P = 0.9D - E \qquad \text{§2.3.2 (Comb. 7)}$$

$$= 0.9(50) - 40 - 0.2(1.0)50 = -5\text{k}$$

Page 120, First sentence should reference Table 12.12-1 not Table 12.2-1.

Page 130, ninth line should read: $F_p = 0.40\ (2400) = 960$ lb/ft

Page 131, third formula from the top of page should read: $R_B = 960 - 576 = 385$ lb/ft

Page 131, paragraph preceding Number 3 should read:

The shears and moments are the Q_E load actions for strength design. Note that the reaction at the roof R_R is not necessarily the force used for wall-to-roof anchorage design, see 12.11.

Page 133, Under Calculations and Discussion, first sentence should end with

specified in §12.11.1

Page 135, beginning with "a." should read:

a. The force set forth in §12.11.1. $F_p = 0.4\ S_{DS}I$

b. A force of 400 $S_{DS}I$ (plf).

c. 280 (plf) of wall.

z = 16 ft = the height of the anchorage of the rigid diaphragm attachment, and W_p is the weight of the wall tributary to the anchor

$$W_p = \left[\left(\frac{20\text{ ft}}{2}\right) + \left(\frac{16\text{ ft}}{2}\right)\right](113\text{ psf}) = 2034\text{ plf}$$

$$F_p = 0.4(1.0)(1.0) = W_p = 0.4(2034) = 814\text{ plf}$$

$$F_p = 400\ S_{DS}I = 400(1.0)(1.0) = 400\text{ plf}$$

$$F_p = 280\text{ plf}$$

$\therefore F_p = 814$ plf controls

Page 163, first equation under Number 1 should read:

$$F_{p1} = \frac{F_1}{W_1} w_{p1}$$

$$F_{p1}\,\max = 0.4\, S_{DS} I W_{p1} = 0.40 W_{p1}$$

$$F_{p1}\,\min = 0.2\, S_{DS} I W_{p1} = 0.2 W_{p1}$$

F_1 = design force at roof
W_1 = structure weight above one half $h_1 = W$
w_{p1} = weight tributary to the collector element

Page 164, Equation 12.4-5 should read:

Here, Q_E is the horizontal collector design force F_{p1} = 53.3 kips, and

$\Omega_o Q_E = 2.5(53.3) = 133.25$ kips axial tension and compression load

$0.2\, S_{DS} D = 0.2(1.2)D = 0.24D$ vertical load

The strength design of the collector and its connections must resist the following load components.

$\Omega_o Q_E = 2.5(53.3) = 133.25$ kips axial tension and compression load
and vertical downward load equal to

$1.2D + 0.5L + 0.24\, D = 1.44\, D + 0.5\, L$

Assume tributary width for D and L is 16'.

with D = (50 ft + 50 ft)(16 ft)(15 psf) = 24,000 lb

L = (50 ft + 50 ft)(16 ft)(20 psf) = 32,000 lb

The resulting total factored vertical load is

1.44(24,000) + 0.5(32,000) = 50,560 lb

which is applied as a uniform distributed load w = 50,560 lb/50 ft = 1011 plf on the 50-foot length of the collector element.

Page 166, second equation, first line, should read:

$$F_p = 0.8(1.0)(1.0)w_p = 0.8w_p = 0.8(1400)$$

Page 174, heading of table at the bottom of page should read:

Level x	h_x (ft)	h_x^k	w_x kips	$w_x h_x^k$	$C_{vx} = \frac{w_x h_x^k}{\sum w_i h_i^k}$	$F_x = C_{vx} V$	$\frac{F_x}{w}$

Page 178. Add a new Number 4 as follows:

4. Seismic separation between adjacent buildings

SEAOC recommends the following seismic separation between adjacent buildings.

$$\delta = \sqrt{(\delta_{M1})^2 + (\delta^2_{M2})}$$

Page 183, bottom of page, Eq 16-41 should read Eq 12.8-11

Page 188, first equation under Calculations and Discussion should read:

$$T = 7.65 \times 10^{-6} \left(\frac{L}{D}\right)^2 \left(\frac{w \times D}{t}\right)^{1/2}$$