

<h1 style="margin: 0;">Structural Steel Design Project</h1> <p style="margin: 10px 0 0 0;"><b>Calculation Sheet</b></p>	Job No:	Sheet <i>1 of 1</i>	Rev
	Job Title: <i>Seismic Resistant Design</i>		
	Worked Example – 1		
		Made by <i>SRSK</i>	Date <i>15-07-00</i>
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**Design Example 1:** Determine the design seismic loads by the seismic coefficient method for a four-storied office building with the following information. The story weights (dead + live loads) are 4200 kN each for the first three stories and 3000 kN for the roof. The first story is 4.2m while the other stories are 3.2m each. The building is an office building with a moment resisting steel frame and has isolated footings with tie beams resting on type II soil. It is located in zone V.

Solution: 1) Calculate the design horizontal seismic coefficient as per IS 1893.  $\alpha_0$  for zone V = 0.08;  $\beta$  for given soil-foundation conditions = 1.0 and  $I = 1.0$

$\therefore \alpha_h = \beta I \alpha_0 = 0.08$

2) Calculate the base shear  $V_B = K C \alpha_h W$

Calculate time period as  $T=0.1n = 0.4$  and so  $C = 0.91$  from the code, Performance factor for moment resisting frame  $K = 1.0$ , and  $W = 13800$  kN

$\therefore V_B = 1005$  kN

1) Calculate the distribution of the base shear at the story levels and then the moments at the story levels.

$$Q_i = V_B \frac{W_i h_i^2}{\sum_1^4 W_i h_i^2}$$

$i$	$h_i(m)$	$W_i(kN)$	$W_i h_i^2$	$Q_i(kN)$	$M_i(kN-m)$
4	13.8	3000	571320	426	0
3	10.6	4200	471912	352	1363
2	7.4	4200	229992	172	3853
1	4.2	4200	74088	55	6893
<i>Total</i>	-	-	1347312	1005	11114

