

ASCE 7 SEISMIC FORCES AND SHEARS AT FLOOR LEVELS - STEEL BUILDING
ASCE 7-10 CHAPTER 12 - SEISMIC REQUIREMENTS FOR BUILDING STRUCTURES
SAMPLE PROJECT, ANYTOWN - NEW DESIGN

1. Seismic Parameter Data

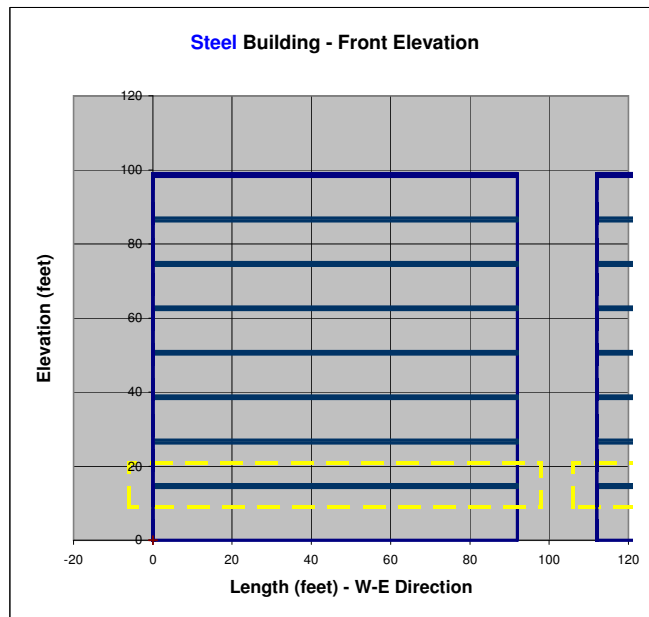
$h_n = 99.0$ feet (Building Height)

	N-S Direction	W-E Direction
LFRS	SMRF	
C_i	0.028	
x	0.80	

System	C_i	x
Steel MRF	0.028	0.80
Concrete MRF	0.016	0.90
EBF	0.030	0.75
All other systems	0.020	0.75

$T_a = C_i h_n^x$ (12.8-7)

T_a	1.11	Seconds (Approximate Fundamental Period)
R	8.0	Response Modification Factor (Table 12.2-1)
K	1.30	(Exponent factor for Floor Levels - Sect 12.8.3)
C_s	0.071	g 's (Seismic Coefficient - Sect 12.8.1)
ρ	1.0	Redundancy Factor (Section 12.3.4)



2. Vertical Distribution of Seismic Forces (Section 12.8.3)

Note: $F_x = \rho C_s W_x H_x^k$ for ρ = Redundancy Factor each side
 C_s = Seismic Coefficient each side
 $W_x H_x^k$ = Product each floor level, each side

Floor Level	Story Weight, W_x (kips)	Floor Elevation, H_x (feet)	N-S and E-W Directions						$W_x H_x^k$	Lateral Force, F_x (kips)	Story Shear, V_x (kips)	$F_x * h_x$ (kip-ft)	Overturning Moment about Roof, M_{OTR} (kip-ft)	Overturning Moment about Base, M_{OTB} (kip-ft)
			$W_x H_x^k$	Lateral Force, F_x (kips)	Story Shear, V_x (kips)	$F_x * h_x$ (kip-ft)	Overturning Moment about Roof, M_{OTR} (kip-ft)	Overturning Moment about Base, M_{OTB} (kip-ft)						
R	1,696	99.0	675,325	235	235	23,241	2,817	23,241						
8	1,574	87.0	529,664	184	419	16,018	7,844	39,259						
7	1,574	75.0	436,535	152	571	11,381	14,691	50,640						
6	1,574	63.0	347,827	121	692	7,617	22,989	58,257						
5	1,574	51.0	264,118	92	783	4,682	32,389	62,940						
4	1,574	39.0	186,210	65	848	2,524	42,566	65,464						
3	1,574	27.0	115,327	40	888	1,082	53,224	66,546						
2	1,596	15.0	54,370	19	907	283	66,830	66,830						

$\sum_{i=1}^n w_i h_i^k = 2,609,376$

$\sum_{i=1}^n w_i h_i^k = 0$

Weight = 12,737 kips

$V = 907$ kips

$V = 0$ kips

$M_{ot} = 66,830$ kip-ft

$M_{ot} = 0$ kip-ft