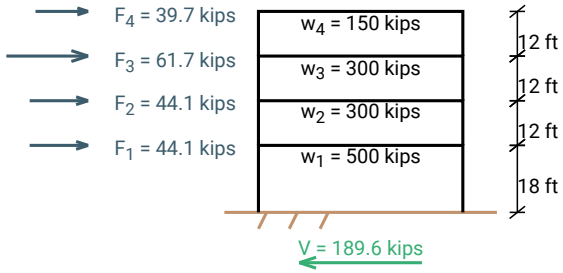
Napior	Company: Napior	Sheet:
	Project: Seismic Loads	
	Description: Determine the seismic loads on a project.	Engr: Charlie Misner

Seismic Loads



1 - Properties

Site Criteria

Address	= Seattle, WA	
Seismic Site Class	= D	*ASCE 7-10 Chapter 20*
T_L	= 6 seconds	*USGS.gov*
S_S	= 1.37 g	*USGS.gov*
S_1	= 0.50 g	*USGS.gov*
F_a	= 1.00	*ASCE 7-10 Table 11.4-1*
F_v	= 1.50	*ASCE 7-10 Table 11.4-2*
S_{ds}	$= \frac{2}{3}F_aS_s = \frac{2}{3}(1)(1.37g) = 0.91$ g	*ASCE 7-10 11.4-3*
S_{d1}	$= \frac{2}{3}F_vS_1 = \frac{2}{3}(1.5)(0.5g) = 0.53$ g	*ASCE 7-10 11.4-4*

Building Criteria

Building Risk Category	= II	*IBC Table 1604.5*
System Category	= Building Frames	*ASCE 7-10 Table 12.02-1*
Structural System	= Special reinforced concrete shear walls	*ASCE 7-10 Table 12.02-1*
R	= 6	*ASCE 7-10 Table 12.02-1*
C_t	= 0.02	*ASCE 7-10 Table 12.8-2*
x	= 0.75	*ASCE 7-10 Table 12.8-2*

2 - Calculate Base Shear

Determine Building Period

Building period is known.

Known Period, T	= 0.2 seconds	*ASCE 7-10 Table 12.8-2*
T_a	= $C_t h_n^x = (0.02)(54\text{ft})^{0.75}$ = 0.398 seconds	*ASCE 7-10 Eqn. 12.8-7*
C_u	= 1.4	*ASCE 7-10 Table 12.8-1*
$C_u T_a$	= $C_u T_a = (1.4)(0.398\,\text{seconds})$ = 0.558 seconds	*ASCE 7-10 Section 12.8.2*
$T_a < T$	∴ T_a = 0.398 seconds	*ASCE 7-10 Section 12.8.2*

Determine Base Shear

C_s	= $\frac{S_{ds}}{(R/I_e)} = \frac{0.91\,g}{(6/1)}$ = 0.15	*ASCE 7-10 Eqn. 12.8-2*
	< $\frac{S_{d1}}{T_a(R/I_e)} = \frac{0.53\,g}{0.398\,s\,(6/1)}$ = 0.22	*ASCE 7-10 Eqn. 12.8-3*
	> $0.44 S_{ds} I_e = 0.44(0.91\,g)(1) > 0.01$ = 0.01	*ASCE 7-10 Eqn. 12.8-5*
C_s	= 0.152	
V	= C_s * W = (0.152)(1250 kips) = 189.6 kips	*ASCE 7-10 Eqn. 12.8-1*

3 - Vertical Force Distribution

k	= 1.00	*ASCE 7-10 Section 12.8.3*
C_{vx}	= $\frac{w_x h_x^k}{\sum_{i=1}^{n} w_i h_i^k}$	*ASCE 7-10 Eqn. 12.8-6*
F_x	= C_{vx}* w_x	*ASCE 7-10 Eqn. 12.8-6*

Table 1 - Story Forces

Story	Height	Weight	$w_x h_x^k$	C_{vx}	F_x (kips)
1	18	500	9000	0.23	44.1
2	30	300	9000	0.23	44.1
3	42	300	12600	0.33	61.7
4	54	150	8100	0.21	39.7