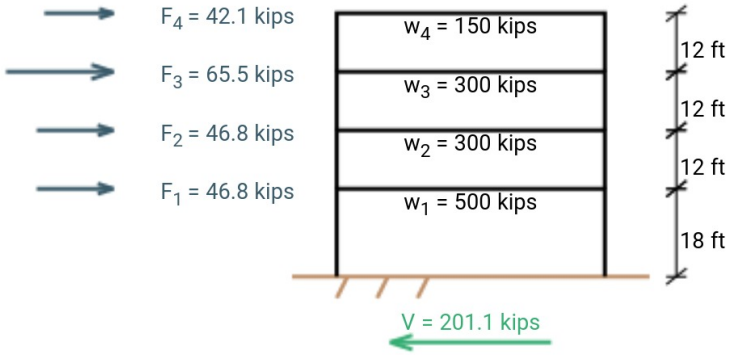
Napior	Company: Napior, LLC	Sheet:
	Project: Seismic Loads	
	Description: Determine the seismic loads.	Engr: Charlie Misner

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	= 1.45 g	*USGS.gov*
S_1	= 0.49 g	*USGS.gov*
F_a	= 1.00	*ASCE 7-10 Table 11.4-1*
F_v	= 1.51	*ASCE 7-10 Table 11.4-2*
S_{ds}	$= \frac{2}{3}F_aS_s = \frac{2}{3}(1)(1.448g) = 0.97$ g	*ASCE 7-10 11.4-3*
S_{d1}	$= \frac{2}{3}F_vS_1 = \frac{2}{3}(1.511)(0.489g) = 0.49$ 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	= 0.5 seconds	*ASCE 7-10 Table 12.8-2*

T_a	$= C_t h_n^x = (0.02)(54ft)^{0.75} = 0.398$ 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*
$T_a > T > C_u T_a$	$\therefore T_a = T = 0.5$ seconds	*ASCE 7-10 Section 12.8.2*

Determine Base Shear

C_s	$= \frac{S_{ds}}{(R/I_e)} = \frac{0.965\,g}{(6/1)} = 0.16$	*ASCE 7-10 Eqn. 12.8-2*
	$< \frac{S_{d1}}{T_a(R/I_e)} = \frac{0.493\,g}{0.398\,s\,(6/1)} = 0.16$	*ASCE 7-10 Eqn. 12.8-3*
	$> 0.44 S_{ds} I_e = 0.44(0.965\,g)(1) > 0.01 = 0.01$	*ASCE 7-10 Eqn. 12.8-5*
C_s	$= 0.161$	
V	$= C_s * W = (0.161)(1250\text{ kips}) = 201.1$ 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	46.8
2	30	300	9000	0.23	46.8
3	42	300	12600	0.33	65.5
4	54	150	8100	0.21	42.1