

Floor Dead Loads

wF4,3,2 Concrete	75 psf
Fire Spr.	3 psf
Ceiling	2 psf
Total	<u>80</u>
Area	4000
Weight =	<u><u>320 kips</u></u>

Wall Dead Loads

wWall4,3,2 Concrete	125 psf
Windows	15 psf
Conc Wall	90 linear ft
Glazing	180 linear ft
Height	12 ft
Conc,wt =	135 kips
Glaz,wt =	32.4 kips
Weight =	<u><u>167.4 kips</u></u>

wF1 Concrete	75 psf
Fire Spr.	3 psf
Ceiling	2 psf
Total	<u>80</u>
Area	4800
Weight =	<u><u>384 kips</u></u>

wWall1 Concrete	125 psf
Windows	15 psf
Conc Wall	90 linear ft
Glazing	230 linear ft
Height	18 ft
Conc,wt =	202.5 kips
Glaz,wt =	62.1 kips
Weight =	<u><u>264.6 kips</u></u>

$S_S, S_{MS}, S_{DS}, S_1, S_{M1}, S_{D1}, F_a, F_v$, (see Chapter 11)

Site Class = **D**
 $S_s = 1.5$
 $S_{Ms} = 1.500$
 $S_{Ds} = 1.000$
 $F_a = 1.00$

 $S_1 = 0.6$
 $S_{M1} = 0.900$
 $S_{D1} = 0.600$
 $F_v = 1.50$

Seismic Design Category = D

$R = 5$ (6 would be ok as well)

$C_s = 0.2$ eq. 12.8-2

$TL = 8$ secs, Figure 22-15

$T_a = 0.398405$ secs, eq 12.8-7

$T_a = 0.4$ secs, eq 12.8-8,

either way $T_a < TL$, use eq. 12.8-3

folks might use eq 12.8-8 but it is not allowed for non moment frame systems...

$C_s = 0.301$ eq. 12.8-3 max

$C_s = 0.01$ eq. 12.8-5 min

$C_s = 0.06$ eq. 12.8-6 min, since $S_1 \geq 0.6$

Use $C_s = 0.2 g$

$k = 1$ Section 12.8.3

Method 1 uses the weight of the floor and wall below the floor,
 Method 2 uses the weight of the floor and half of the wall above and half of the wall below.

Compute Story Forces:

Level ID:	Mass and V, kips		h, ft	$w_x * h_x^k$		C_{vx}		F_x	
	Method 1	Method 2		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
4	487.4	403.7	54	26319.6	21799.8	0.360112	0.322041	152.025	127.4317
3	487.4	487.4	42	20470.8	20470.8	0.280087	0.302408	118.2417	119.6629
2	487.4	487.4	30	14622	14622	0.200062	0.216006	84.45834	85.47353
1	648.6	600	18	11674.8	10800	0.159738	0.159545	67.43498	63.13186
Total	2110.8	1978.5		73087.2	67692.6			422.16	395.7
V =	422.16	395.7							

See 12.8.4.2 for 5% accidental torsion...

Find Line Of Action, X goes the right, Z is up and down, Y is vertical

Level ID:	Level Center of Mass		-5% of bldg width				+5% of bldg width							
	X	Z	LOA, X		LOA, Z		LOA, X		LOA, Z		LOA, X		LOA, Z	
			Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
4	40	25	40	40	25	25	36	36	22.5	22.5	44	44	27.5	27.5
3	40	25	40	40	25	25	36	36	22.5	22.5	44	44	27.5	27.5
2	40	25	40	40	25	25	36	36	22.5	22.5	44	44	27.5	27.5
1	40	30.83333	40	40	25.9318	25.93068	36	36	22.4318	22.43068	44	44	29.4318	29.43068

Level 1 Wall Forces, Flexible Diaphragm:

Wall Line

ID	Method 1	Method 2
Level 4		
A	19.00313	15.92896
B	76.01251	63.71583
D	57.00938	47.78688
1	76.01251	63.71583
2	76.01251	63.71583
Level 3		
A	33.78334	30.88683
B	135.1333	123.5473
D	88.68126	79.83945
1	135.1333	123.5473
2	135.1333	123.5473
Level 2		
A	44.34063	41.57102
B	177.3625	166.2841
D	120.3531	111.892
1	177.3625	166.2841
2	177.3625	166.2841

Level 1		
A	52.77	49.4625
B	211.08	197.85
D	145.6412	135.5665
1	211.08	197.85
2	211.08	197.85

(answers to part C), have to keep a running total from above...

Level 1 Wall Forces, Rigid Diaphragm:

CSx = 56.66667 ft Center of Stiffness...

CSz = 25 ft

Jo = 9233.333

Method 1 Method 2

My, z = 7036 6595 @ LOA

My, z = 8724.64 8177.8 @ LOA -5%

My, z = 5347.36 5012.2 @ LOA +5%

My, x = 393.3707 368.2692 @ LOA

My, x = -1084.19 -1016.68 @ LOA -5%

My, x = 1870.931 1753.219 @ LOA +5%

My * S * (dist to CS)/Jo

Level 1	Just Sx*V/ΣSx part				no accidental torsion				-5% of bldg width				+5% of bldg width			
	LOA, X		LOA, Z		LOA, X		LOA, Z		LOA, X		LOA, Z		LOA, X		LOA, Z	
	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
A	0	0	70.36	65.95	2.41	2.26	43.18	40.47	-6.65	-6.24	53.54	50.19	11.48	10.76	32.82	30.76
B	0	0	70.36	65.95	1.56	1.46	27.94	26.19	-4.31	-4.04	34.65	32.48	7.43	6.96	21.24	19.90
D	0	0	281.44	281.44	-3.98	-3.72	-71.12	-66.66	10.96	10.28	-88.19	-82.66	-18.91	-17.72	-54.05	-50.66
1	211.08	197.85	0	0	-2.13	-1.99	38.10	38.10	5.87	5.51	47.25	44.28	-10.13	-9.49	28.96	27.14
2	211.08	197.85	0	0	2.13	1.99	-38.10	-35.71	-5.87	-5.51	-47.25	-44.28	10.13	9.49	-28.96	-27.14

(Just Sx*V/SSx) + (My * S * (dist to CS)/Jo)

Level 1	no accidental torsion				-5% of bldg width				+5% of bldg width			
	LOA, X		LOA, Z		LOA, X		LOA, Z		LOA, X		LOA, Z	
	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
A	2.41	2.26	113.54	106.42	-6.65	-6.24	123.90	116.14	11.48	10.76	103.18	96.71
B	1.56	1.46	98.30	92.14	-4.31	-4.04	105.01	98.43	7.43	6.96	91.60	85.85
D	-3.98	-3.72	210.32	214.78	10.96	10.28	193.25	198.78	-18.91	-17.72	227.39	230.78
1	208.95	195.86	38.10	38.10	216.95	203.36	47.25	44.28	200.95	188.36	28.96	27.14
2	213.21	199.84	-38.10	-35.71	205.21	192.34	-47.25	-44.28	221.21	207.34	-28.96	-27.14

Answers to part D