

CHAPTER 2

2.1

Hardwood	psf
Plywood	4
Framing	3
Ceiling support	2.6
Ceiling	0.5

15.1 psf

2.2 1. Framing dead load adjustment
DL of 3 sections/ft @ 4 in. OC = 2.6 psf
DL / section = $\frac{2.6}{3}$

At 3 in. OC. # of sections/ft = 4
DL of 4 sections/ft @ 3 in. OC
= $\frac{4}{3}(2.6) = 3.47$ psf

2. Concrete slab / unit area
 $1 \text{ ft} \times 1 \text{ ft} \times \frac{1}{12} \text{ ft} \times 150 = 12.5$ psf

3. Floor dead load	psf
Slab	12.5
Plywood	3
Framing	3.47
Supports	0.5
Ceiling	5

24.47 psf

2.3 1. $L_0 = 40$ psf
2. Tributary area = $20 \times 17.5 = 350 \text{ ft}^2$

3. For interior beams $K_{LL} = 2$
4. $K_{LL} A_T = 2(350) = 700$
5. $K = 0.25 + \frac{15}{\sqrt{700}} = 0.82$
6. $L = 0.82(40) = 32.7$ psf

2.4 1. Basic load for office = 50 psf
2. Loads from two floors = 100 psf
3. $A_T = 40 \times 40 = 1600 \text{ ft}^2$
4. $K_{LL} = 4$
5. $K_{LL} A_T = 6400$
6. $K = 0.25 + \frac{15}{\sqrt{6400}} = 0.44 > 0.4$ OK
7. $L = 0.44(100) = 44$ psf

2.5 1. For light industry $L_0 = 125$ psf
2. $A_T = 50 \times 20 = 1000 \text{ ft}^2$
3. $K_{LL} = 4$
4. $K_{LL} A_T = 4000$
5. $K = 0.25 + \frac{15}{\sqrt{4000}} = 0.49 < 0.5$ Use 0.5
6. $L = 0.5(125) = 62.5$ psf

2.6 1. $K_{LL} = 1$
2. $K_{LL} A_T = 1000$
3. $K = 0.25 + \frac{15}{\sqrt{1000}} = 0.72$
4. $L = 0.72(125) = 90$ psf

2.7 1. $L_0 = 125$ psf
2. $A_T = 50 \times 20 = 1000 \text{ ft}^2$
3. Interior beam $K_{LL} = 2$
4. $K_{LL} A_T = 2000$
5. $K = 0.25 + \frac{15}{\sqrt{2000}} = 0.585$
6. $L = 0.585(125) = 73.13$ psf
7. Design Loads
L 73.13
Impact factor 50% 36.57
Partition load 15.00

124.7 psf

2.8 1. Roof Live load $L_0 = 20$ psf
2. Horizontal length of roof = 20.3 ft
3. $A_T = 10 \times 20.3 = 203 \text{ ft}^2$
4. $R_1 = 1.2 - 0.001(203) = 1$
5. $\theta = 32.21^\circ$
6. $R_2 = 1.2 - 0.6 \tan 32.21 = 0.82$
7. $L_r = (1)(0.82)(20) = 16.4$ psf

2.9 1. $L_0 = 20$ psf
2. $A_T = 4 \times 20.3 = 81.2 < 200 \text{ ft}^2$, $R_1 = 1$
3. $R_2 = 0.82$
4. $L_r = (1)(0.82)(20) = 16.4$ psf

- 2.10
1. $L_0 = 20$ psf
 2. Pitch $\theta = 26.57^\circ$
 3. Span of ridge beam = 20 ft
 4. Horizontal tributary area
 $= 20 \times 15 = 300 \text{ ft}^2$
 5. $R_1 = 1.2 - 0.001(300) = 0.9$
 6. $R_2 = 1.2 - 0.6 \tan 26.57 = 0.9$
 7. $L_r = (0.9)(0.9)(20) = 16.2$ psf

- 2.11
1. $L_0 = 20$ psf
 2. $\theta = 26.57^\circ$
 3. Length of wall = 40 ft
 4. Tributary area = $40 \times 7.5 = 300 \text{ ft}^2$
 5. $R_1 = 0.9$
 6. $R_2 = 0.9$
 7. $L_r = (0.9)(0.9)(20) = 16.2$ psf

2.12

1. Roof live load reductions do not apply. However the provisions of floor reductions apply.

2. $L_0 = 100$ psf
3. $A_T = 250 \text{ ft}^2$
4. Interior column $K_{LL} = 4$
5. $K_{LL} A_T = 1000$
6. $K = 0.25 + \frac{15}{\sqrt{1000}} = 0.72$
7. $L_r = 0.72(100) = 72$ psf