

CHAPTER 2

PROBLEM # 2-1

1. $1.4 D = 1.4 (100) = \underline{\hspace{10em}} 140 \text{ PSF}$

2. $1.2 D + 1.6 L + 0.5 (L_r \text{ or } S \text{ or } R)$
 $1.2(100) + 1.6(70) + 0.5(30) = \underline{\hspace{10em}} 247 \text{ PSF} \leftarrow$

3. $1.2 D + 1.6 (L_r \text{ or } S \text{ or } R) + (0.5L \text{ or } 0.5W)$
 $1.2(100) + 1.6(30) + 0.5(70) = \underline{\hspace{10em}} 203 \text{ PSF}$

4. $1.2 D + 1.0 W + 0.5 L + 0.5 (L_r \text{ or } S \text{ or } R)$
 $1.2(100) + 1.0(0) + 0.5(70) + 0.5(30) = \underline{\hspace{10em}} 170 \text{ PSF}$

5. $1.2 D + 1.0 E + 0.5 L + 0.2 S$
 $1.2(100) + 1.0(0) + 0.5(70) + 0.2(30) = \underline{\hspace{10em}} 161 \text{ PSF}$

6. $0.9 D + 1.0 W$
 $0.9(100) + 1.0(0) = \underline{\hspace{10em}} 90 \text{ PSF}$

7. $0.9 D + 1.0 E$
 $0.9(100) + 1.0(0) = \underline{\hspace{10em}} 90 \text{ PSF}$

GOVERNING FACTORED LOAD = 247 PSF (CASE 2.)

PROBLEM # 2-2

1. $1.4D = 1.4(12000) = \text{-----} 16,800\text{lb}$

2. ----- DOES NOT CONTROL -----
(BY INSPECTION)

3. $1.2D + 1.6(L\text{ or }S\text{ or }R) + (0.5L\text{ or }0.5W)$

$1.2(12,000) + 1.6(\phi) + 0.5(+52,000) = \text{-----} 40,400\text{lb}$

4. $1.2D + 1.0W + 0.5L + 0.5(L\text{ or }S\text{ or }R)$

$1.2(12,000) + 1.0(52,000) = \text{-----} 66,400\text{lb} \leftarrow$

5. ----- DOES NOT CONTROL -----
(BY INSPECTION)

6. $0.9(D) + 1.0W$ (UPLIFT)

$0.9(12000) + 1.0(-52,000) = \text{-----} -41,200\text{lb} \leftarrow$

7. ----- DOES NOT CONTROL -----
(BY INSPECTION)

MAXIMUM FACTORED LOADS:

+ 66,400 lb	CASE 4,
- 41,200 lb	CASE 6,

PROBLEM # 2-3

1. $1.4 D = 1.4(9000) = \text{—————} 12,600 \text{ lb}$
2. $1.2 D + 1.6 L + 0.5(L_r \text{ or } S \text{ or } R)$
 $1.2(9000) + 1.6(5000) + 0.5(2500) = \text{—————} 20,050 \text{ lb} \leftarrow$
3. $1.2 D + 1.6(L_r \text{ or } S \text{ or } R) + (0.5 L \text{ or } 0.5 W)$
 $1.2(9000) + 1.6(2500) + 0.5(5000) = \text{—————} 17,300 \text{ lb}$
4. $1.2 D + 1.0 W + 0.5 L + 0.5(L_r \text{ or } S \text{ or } R)$
 $1.2(9000) + 1.0(\phi) + 0.5(5000) + 0.5(2500) = \text{————} 14,550 \text{ lb}$
5. $1.2 D + 1.0 E + 0.5 L + 0.2 S$
 $1.2(9000) + 1.0(6500) + 0.5(5000) + 0.2(\phi) = \text{—} 19,800 \text{ lb}$
6. $\text{———— DOES NOT CONTROL ————}$
 (BY INSPECTION)
7. $0.9 D + 1.0 E \text{ (UPLIFT)}$
 $0.9(9000) + 1.0(-6500) = \text{—————} 1,600 \text{ lb}$

MAXIMUM FACTORED LOADS: + 20,050 lb CASE 2 NO UPLIFT
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PROBLEM # 2-4

1. $1.4 D = 1.4 (24) = \underline{\hspace{2cm}} 33.6 \text{ PSF}$

2. $1.2 D + 1.6 L + 0.5 (Lr \text{ or } S \text{ or } R)$
 $1.2(24) + 1.6(\phi) + 0.5(16) = \underline{\hspace{2cm}} 36.8 \text{ PSF}$

3. $1.2 D + 1.6 (Lr \text{ or } S \text{ or } R) + (0.5 L \text{ or } 0.5 W)$
 $1.2(24) + 1.6(16) + 0.5(42) = \underline{\hspace{2cm}} 75.4 \text{ PSF}$

4. $1.2 D + 1.0 W + 0.5 L + 0.5 (Lr \text{ or } S \text{ or } R)$
 $1.2(24) + 1.0(42) + 0.5(0) + 0.5(16) = \underline{\hspace{2cm}} 78.8 \text{ PSF}$

5. DOES NOT CONTROL
(BY INSPECTION)

6. $0.9 D + 1.0 W \text{ (UPLIFT)}$
 $0.9(24) + 1.0(-42) = \underline{\hspace{2cm}} -20.4 \text{ PSF}$

7. DOES NOT CONTROL
(BY INSPECTION)

MAXIMUM FACTORED LOADS :

+ 78.8 PSF CASE 4.

- 20.4 PSF CASE 6.

PROBLEM # 2-5

$$D = 64 \text{ psf} \quad L = 100 \text{ psf}$$

$$\text{BEAM SPACING} = 7' - 6''$$

$$D(\text{PLF}) = 64(7.5) = 480 \text{ PLF}$$

$$L(\text{PLF}) = 100(7.5) = 750 \text{ PLF}$$

1. $1.4 D = 1.4(480) = \underline{\hspace{2cm}} 672 \text{ PLF}$

2. $1.2 D + 1.6 L + 0.5(L_r \text{ or } S \text{ or } R)$

$$1.2(480) + 1.6(750) = \underline{\hspace{2cm}} 1776 \text{ PLF} \leftarrow$$

3. $1.2 D + 1.6(L_r \text{ or } S \text{ or } R) + (0.5L \text{ or } 0.5W)$

$$1.2(480) + 0.5(750) = \underline{\hspace{2cm}} 951 \text{ PLF}$$

4. $1.2 D + 1.0 W + 0.5 L + 0.5(L_r \text{ or } S \text{ or } R)$

$$1.2(480) + 0.5(750) = \underline{\hspace{2cm}} 951 \text{ PLF}$$

5. $1.2 D + 1.0 E + 0.5 L + 0.2 S$

$$1.2(480) + 0.5(750) = \underline{\hspace{2cm}} 951 \text{ PLF}$$

6. $0.9 D + 1.0 W$ (NO UPLIFT)

$$0.9(480) = \underline{\hspace{2cm}} 432 \text{ PLF}$$

7. $0.9 D + 1.0 E$ (NO UPLIFT)

$$0.9(480) = \underline{\hspace{2cm}} 432 \text{ PLF}$$

MAXIMUM FACTORED LOAD = 1776 PLF CASE 2.

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PROBLEM # 2-6

$$D = 20 \text{ PSF} \quad S = 12 \text{ PSF}, L_v = 18 \text{ PSF}, W = 38 \text{ PSF} \begin{matrix} \uparrow (-) \\ 16 \text{ PSF} \downarrow (+) \end{matrix}$$

$$\text{BEAM SPACING} = 6'-0''$$

$$D \text{ (PLF)} = 20(6) = 120 \text{ PLF}$$

$$S \text{ (PLF)} = 12(6) = 72 \text{ PLF}$$

$$L_v \text{ (PLF)} = 18(6) = 108 \text{ PLF}$$

$$W \text{ (PLF)} = -38(6) = -228 \text{ PLF}$$

$$\text{OR} = +16(6) = 96 \text{ PLF}$$

$$1. \quad 1.4D = 1.4(120) = \underline{\hspace{4cm}} 168 \text{ PLF}$$

$$2. \quad 1.2D + 1.6L + 0.5(L_v \text{ or } S \text{ or } R) \\ 1.2(120) + 0.5(108) = \underline{\hspace{4cm}} 198 \text{ PLF}$$

$$3. \quad 1.2D + 1.6(L_v \text{ or } S \text{ or } R) + (0.5L \text{ or } 0.5W) \\ 1.2(120) + 1.6(108) + 0.5(96) = \underline{\hspace{4cm}} 364.8 \text{ PLF} \leftarrow$$

$$4. \quad 1.2D + 1.0W + 0.5L + 0.5(L_v \text{ or } S \text{ or } R) \\ 1.2(120) + 1.0(96) + 0.5(108) = \underline{\hspace{4cm}} 294 \text{ PLF}$$

$$5. \quad 1.2D + 1.0E + 0.5L + 0.2S \\ 1.2(120) + 0.2(72) = \underline{\hspace{4cm}} 158.4 \text{ PLF}$$

$$6. \quad 0.9D + 1.0W \text{ (UPLIFT)} \\ 0.9(120) + 1.0(-228) = \underline{\hspace{4cm}} -120.0 \text{ PLF}$$

7. DOES NOT CONTROL - BY INSPECTION \leftarrow

MAXIMUM FACTORED LOADS:

364.8 PLF CASE 3. DOWNWARD
-120.0 PLF CASE 6. UPWARD

PROBLEM # 2-7

1. $D = 100 = \underline{\hspace{2cm}} 100 \text{ PSF}$

2. $D + L = 100 + 70 = \underline{\hspace{2cm}} 170 \text{ PSF}$

3. $D + (L_r \text{ or } S \text{ or } R) = 100 + 30 = \underline{\hspace{2cm}} 130 \text{ PSF}$

4. $D + 0.75(L) + 0.75(L_r \text{ or } S \text{ or } R)$
 $100 + 0.75(70) + 0.75(30) = \underline{\hspace{2cm}} 175 \text{ PSF} \leftarrow$

5. $D + (0.6W \text{ or } 0.7E) = 100 + 0 = \underline{\hspace{2cm}} 100 \text{ PSF}$

6a. $D + 0.75L + 0.75(0.6W) + 0.75(L_r \text{ or } S \text{ or } R)$
 $100 + 0.75(70) + 0 + 0.75(30) = \underline{\hspace{2cm}} 175 \text{ PSF}$

6b. $D + 0.75L + 0.75(0.7E) + 0.75(S)$
 $100 + 0.75(70) + 0 + 0.75(30) = \underline{\hspace{2cm}} 175 \text{ PSF}$

7. $0.6D + 0.6W$ (UPLIFT)
 $0.6(100) + 0 = \underline{\hspace{2cm}} 60 \text{ PSF (NO UPLIFT)}$

8. $0.6D + 0.7E$ (UPLIFT)
 $0.6(100) + 0 = \underline{\hspace{2cm}} 60 \text{ PSF (NO UPLIFT)}$

GOVERNING LOAD = 175 PSF CASE 4.

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PROBLEM # 2-8

1. $D = 12000 = \underline{\hspace{10em}} 12,000 \text{ lb}$

2. $D + L = 12,000 = \underline{\hspace{10em}} 12,000 \text{ lb}$

3. $D + (L \text{ or } S \text{ or } R) = 12,000 = \underline{\hspace{10em}} 12,000 \text{ lb}$

4. $D + 0.75L + 0.75(L \text{ or } S \text{ or } R)$
 $12,000 = \underline{\hspace{10em}} 12,000 \text{ lb}$

5. $D + (0.6W \text{ or } 0.7E)$
 $12,000 + 0.6(52,000) = \underline{\hspace{10em}} 43,200 \text{ lb} \leftarrow$

6a. $D + 0.75L + 0.75(0.6W) + 0.75(L \text{ or } S \text{ or } R)$
 $12,000 + 0 + 0.75(0.6)52,000 + 0 = \underline{\hspace{10em}} 35,400 \text{ lb}$

6b. $D + 0.75L + 0.75(0.7E) + 0.75(S)$
 $12,000 + 0 = \underline{\hspace{10em}} 12,000 \text{ lb}$

7. $0.6D + 0.6W$ (UPLIFT)
 $0.6(12,000) + 0.6(-52,000) = \underline{\hspace{10em}} -24,000 \text{ lb}$
(UPLIFT)

8. $0.6D + 0.7E$
 $0.6(12,000) + 0 = \underline{\hspace{10em}} 7,200 \text{ lb}$
(NO UPLIFT)

GOVERNING LOADS:	
+ 43,200 lb	CASE 5.
- 24,000 lb	CASE 7.

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PROBLEM # 2-9

1. $D = 9000 =$ _____ $9,000/lb$

2. $D + L = 9000 + 5000 =$ _____ $14,000/lb$

3. $D + (Lr \text{ or } S \text{ or } R) = 9000 + 2500 =$ _____ $11,500/lb$

4. $D + 0.75L + 0.75(Lr \text{ or } S \text{ or } R)$
 $9000 + 0.75(5000) + 0.75(2500) =$ _____ $14,625/lb$

5. $D + (0.6W \text{ or } 0.7E)$
 $9000 + 0.7(6500) =$ _____ $13,550/lb$

6a. $D + 0.75L + 0.75(0.6W) + 0.75(Lr \text{ or } S \text{ or } R)$
 $9000 + 0.75(5000) + 0 + 0.75(2500) =$ _____ $14,625/lb$

6b. $D + 0.75L + 0.75(0.7E) + 0.75(Lr \text{ or } S \text{ or } R)$
 $9000 + 0.75(5000) + 0.75(0.7)(6500) + 0.75(2500) = 18,037.5/lb \leftarrow$

7. $0.6D + 0.6W$ UPLIFT
 $0.6(9000) + 0 =$ _____ $5,400/lb$ (No UPLIFT)

8. $0.6D + 0.7E$ UPLIFT
 $0.6(9000) + 0.7(-6500) =$ _____ $850/lb$ (No UPLIFT)

GOVERNING LOADS:
18,037.5/lb CASE 6a.
NO UPLIFT

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PROBLEM # 2-10

1. $D = 24 = \underline{\hspace{10em}}$ 24 psf
2. $D + L = 24 = \underline{\hspace{10em}}$ 24 psf
3. $D + (L_r \text{ or } S \text{ or } R) = 24 + 16 = \underline{\hspace{10em}}$ 40 psf
4. $D + 0.75L + 0.75(L_r \text{ or } S \text{ or } R)$
 $24 + 0.75(16) = \underline{\hspace{10em}}$ 36 psf
5. $D + (0.6W \text{ or } 0.7E)$
 $24 + 0.6(42) = \underline{\hspace{10em}}$ 49.2 psf
- 6a. $D + 0.75L + 0.75(0.6W) + 0.75(L_r \text{ or } S \text{ or } R)$
 $24 + 0 + 0.75(0.6)(42) + 0.75(16) = \underline{\hspace{10em}}$ 54.9 psf ←
- 6b. $D + 0.75L + 0.75(0.7E) + 0.75(L_r \text{ or } S \text{ or } R)$
 $24 + 0 + 0 + 0.75(16) = \underline{\hspace{10em}}$ 36 psf
7. $0.6D + 0.6W$ UPLIFT
 $0.6(24) + 0.6(-42) = \underline{\hspace{10em}}$ -10.8 psf ←
UPLIFT
8. $0.6D + 0.7E$ UPLIFT
 $0.6(24) + 0 = \underline{\hspace{10em}}$ 14.4 psf
(NO UPLIFT)

GOVERNING LOADS:

54.9 psf	CASE 6a.
-10.8 psf	CASE 7. UPLIFT

SFC ✓

PROBLEM # 2-11

$$D = 64 \text{ psf} \quad L = 100 \text{ psf}$$

$$\text{BEAM SPACING} = 7.5 \text{ ft}$$

$$D (\text{PLF}) = 64(7.5) = 480 \text{ PLF}$$

$$L (\text{PLF}) = 100(7.5) = 750 \text{ PLF}$$

1. $D = 480 = \underline{\hspace{10em}} 480 \text{ PLF}$
2. $D + L = 480 + 750 = \underline{\hspace{10em}} 1230 \text{ PLF} \leftarrow$
3. $D + (L_r \text{ or } S \text{ or } R) = 480 = \underline{\hspace{10em}} 480 \text{ PLF}$
4. $D + 0.75L + 0.75(L_r \text{ or } S \text{ or } R)$
 $480 + 0.75(750) = \underline{\hspace{10em}} 1042.5 \text{ PLF}$
5. $D + (0.6W \text{ or } 0.7E) = 480 = \underline{\hspace{10em}} 480 \text{ PLF}$
- 6a. $D + 0.75L + 0.75(0.6W) + 0.75(L_r \text{ or } S \text{ or } R)$
 $480 + 0.75(750) = \underline{\hspace{10em}} 1042.5 \text{ PLF}$
- 6b. $D + 0.75L + 0.75(0.7E) + 0.75(L_r \text{ or } S \text{ or } R)$
 $480 + 0.75(750) = \underline{\hspace{10em}} 1042.5 \text{ PLF}$
7. $0.6D + 0.6W$ UPLIFT
 $0.6(480) + 0 = \underline{\hspace{10em}} 288 \text{ PLF}$
8. $0.6D + 0.7E$
 $0.6(480) + 0 = \underline{\hspace{10em}} 288 \text{ PLF}$

GOVERNING LOAD:

1230 PLF CASE 2.

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PROBLEM # 2-12

$D = 20 \text{ psf}$ $S = 12 \text{ psf}$, $L_r = 18 \text{ psf}$, $W = 38 \text{ psf}$ \uparrow (-)

16 psf \downarrow (+)

BEAM SPACING = $6'-0''$

$D \text{ (PLF)} = 20 (6) = 120 \text{ PLF}$

$S \text{ (PLF)} = 12 (6) = 72 \text{ PLF}$

$L_r \text{ (PLF)} = 18 (6) = 108 \text{ PLF}$

$W \text{ (PLF)} = -38 (6) = -228 \text{ PLF}$

$+ 16 (6) = 96 \text{ PLF}$

1. $D = 120 = \text{_____} 120 \text{ PLF}$

2. $D + L = 120 = \text{_____} 120 \text{ PLF}$

3. $D + (L_r \text{ or } S \text{ or } R) = 120 + 108 = \text{_____} 228 \text{ PLF}$

4. $D + 0.75L + 0.75(L_r \text{ or } S \text{ or } R)$

$120 + 0.75(108) = \text{_____} 201 \text{ PLF}$

5. $D + (0.6W \text{ or } 0.7E)$

$120 + 0.6(96) = \text{_____} 177.6 \text{ PLF}$

6a. $D + 0.75L + 0.75(0.6W) + 0.75(L_r \text{ or } S \text{ or } R)$

$120 + 0 + 0.75(0.6)(96) + 0.75(108) = \text{_____} 244.2 \text{ PLF} \leftarrow$

6b. $D + 0.75L + 0.75(0.7E) + 0.75(L_r \text{ or } S \text{ or } R)$

$120 + 0 + 0 + 0.75(108) = \text{_____} 201 \text{ PLF}$

7. $0.6D + 0.6W$ UPLIFT

$0.6(120) + 0.6(-228) = \text{_____} -64.8 \text{ PLF}$

UPLIFT

GOVERNING LOADS:

244.2 PLF CASE 6a.

- 64.8 PLF CASE 7. UPLIFT

SFC ✓

8. — DOES NOT CONTROL (by Inspection) —