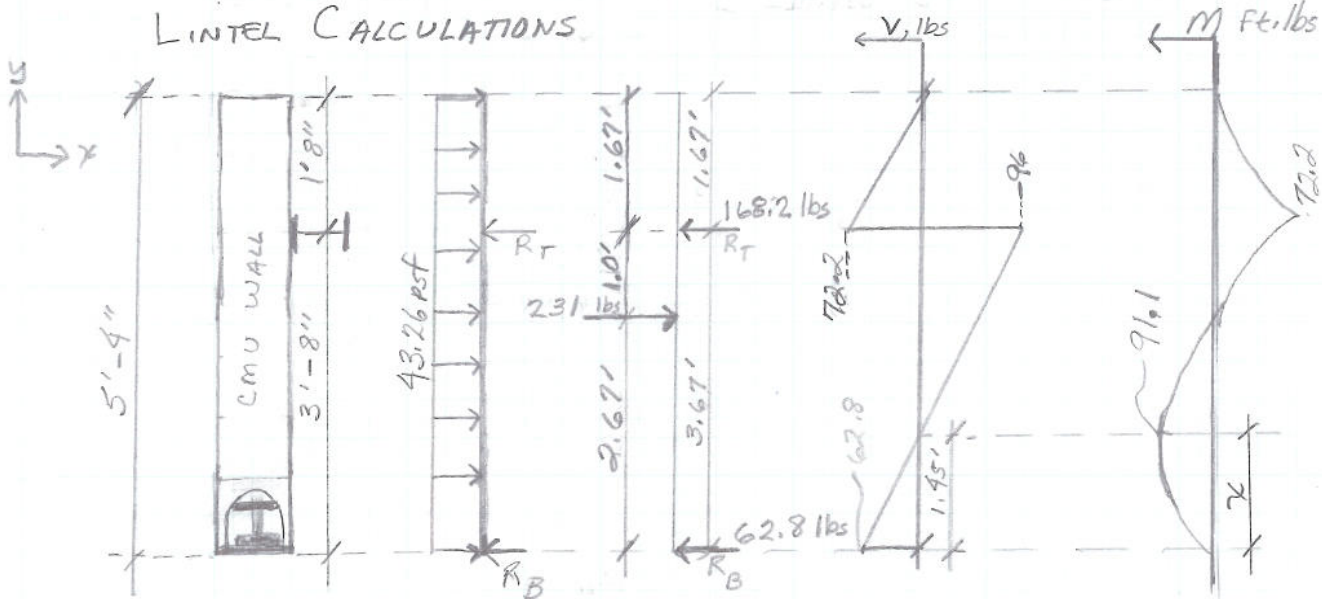


BUILDING 2441 LINTEL & WIND BEAM CALCULATIONS

LINTEL CALCULATIONS



$$\sum M_{RT} = 0 \Rightarrow R_B = \frac{1}{3.67'} [231 \text{ lbs} \times 1.0'] = 62.8 \text{ lbs}$$

$$\sum F_x = 0 \Rightarrow R_T = 231 - 62.8 \text{ lbs} = 168.2 \text{ lbs}$$

$$x = \frac{62.8}{43.26} = 1.45'$$

$$M_{max} = \frac{1}{2} [1.45' \times 62.8 \text{ lbs}] = 91.1 \text{ ft-lbs}$$

Use 8" CMU

$$d = \frac{7.63''}{2} = 3.8''$$

$$A_s = \frac{M}{F_s j d}$$

Assume $j = 0.9$ for initial estimate

Allow $\frac{1}{3}$ stress increase for wind load

$$A_s_{required} = \frac{91.1 \text{ ft-lbs} \times 12 \frac{\text{in}}{\text{ft}}}{24,000 \text{ psi} \times 1.33 \times 0.9 \times 3.8''} = 0.100 \text{ in}^2$$

Use #4 @ 24 in o.c. ($A_s = 0.20 \frac{12}{24} = 0.10 \text{ in}^2$)

check strength

Use 2.0' wide strip \therefore Design moment = $91.1 \text{ ft-lbs} \times 2 = 182.2 \text{ ft-lbs}$

$$p = \frac{A_s}{bd} = \frac{0.20 \text{ in}^2}{24 \times 3.8 \text{ in}} = 0.002$$

$$np = 0.0322$$

$$k^2 + 0.064k - 0.064 = 0$$

$$k = 0.220$$

$$j = \left(1 - \frac{k}{3}\right) = \left(1 - \frac{0.22}{3}\right) = 0.927$$

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BLDG 2441 26ft Door Lintel Weight (cont.)

Allowable Tension Flexural capacity

$$M_T = A_s j d F_s = 0.1 \text{ in}^2 \times 0.927 \times 3.8 \text{ in} \times 24,000 \text{ psi} \times \frac{1.33}{12 \text{ in/ft}}$$

$$\Rightarrow M_T = 1874 \text{ ft-lbs} > 182.2 \text{ ft-lbs} \therefore \text{OK}$$

Allowable Compression Flexural capacity

$$F_b = \frac{1}{3} f'_m \times 1.33 = \frac{1}{3} (1500 \text{ psi}) \times 1.33 = 665 \text{ psi}$$

$$M_c = \frac{b d^2}{2} k j F_b$$

$$M_c = \frac{24 \times (3.8 \text{ in})^2}{2} \times 0.220 \times 0.927 \times \frac{665 \text{ psi}}{12 \text{ in/ft}}$$

$$M_c = 1958 \text{ ft-lbs} > 182.2 \text{ ft-lbs} \therefore \text{OK}$$

USE #4 24" O.C.

Calculate beam to support weight

CMU, hollow core = 55 pcf

Mortar, masonry = 116 pcf

Concrete = 150 pcf

Steel = 489 pcf

1ea solid filled CMU w/ 2 bars = 1806.7 lbs

6 courses hollow CMU = 5,720.0 lbs

mortar = 1,508.0 lbs

vertical #4 @ 24oc = 43.6 lbs

vertical concrete = 2,520.0 lbs

Total weight = 11,598.3 lbs

weight/LF = 446.1 pcf

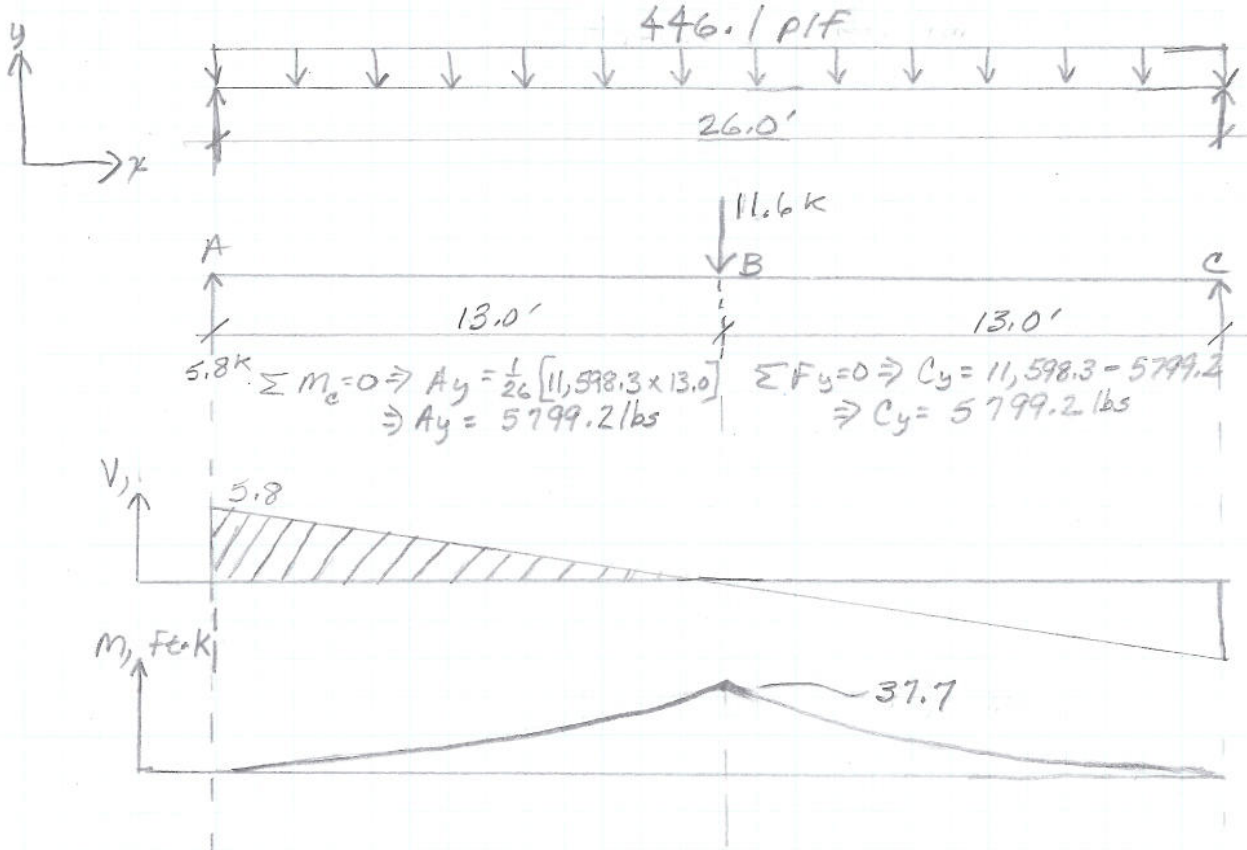
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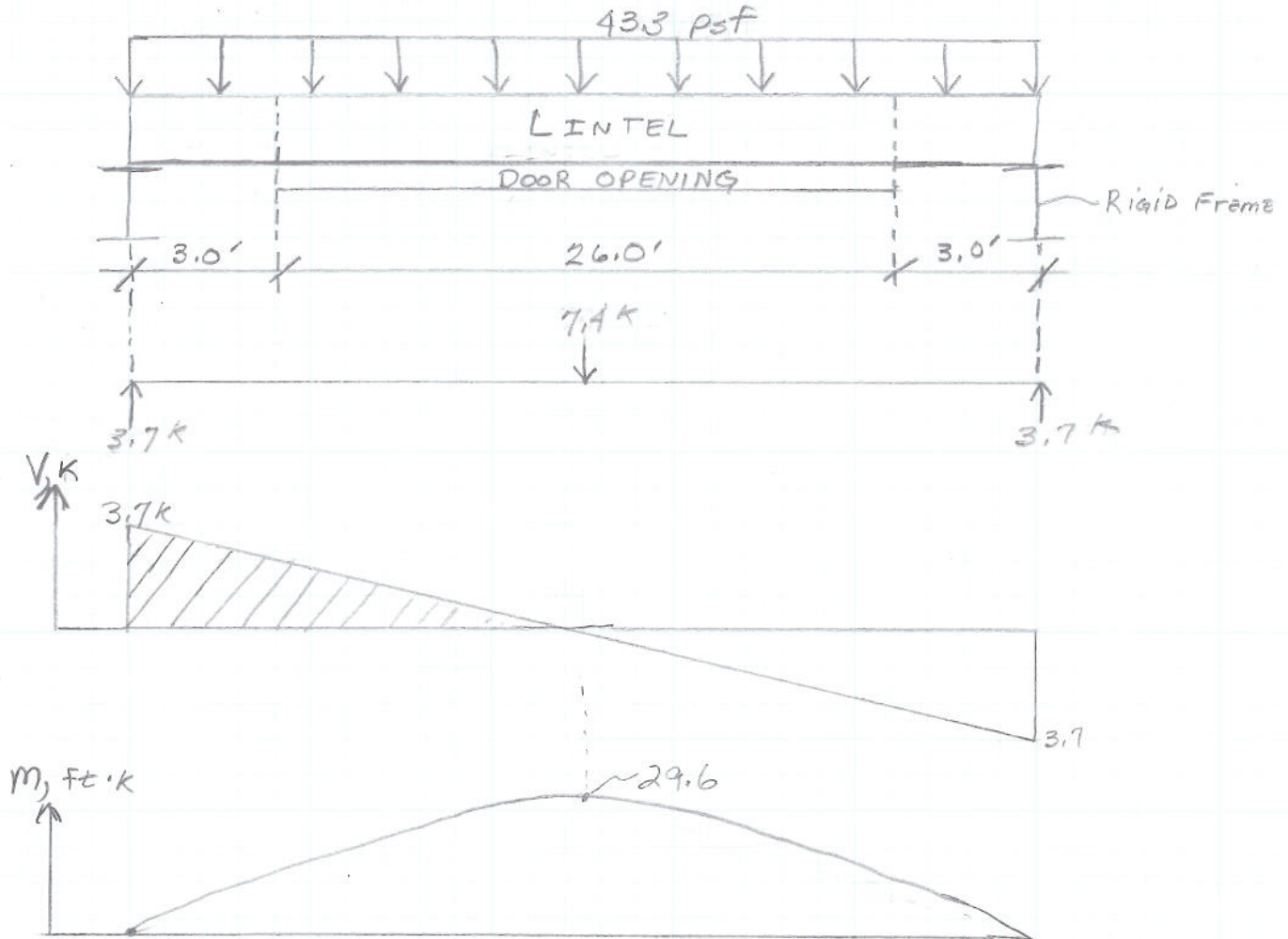
BLDG 2441

26 ft Door Lintel Weight Calc (cont.)



$$\text{Section modulus } S = \frac{M \times 12 \text{ in/ft}}{24,000 \text{ psi}} = \frac{37.7 \text{ K} \times 12 \text{ in/ft}}{24 \text{ K} \cdot \text{lb/in}^2} = 18.9 \text{ in}^3 \text{ x-x}$$

Bldg 2441 WIND BEAM CALCULATIONS



BEAM SELECTION

Section modulus $S_{yy} = \frac{m \times 12 \text{ in/ft}}{24,000 \text{ psi}} = \frac{29.6 \text{ ft.k} \times 12 \text{ in/ft}}{24 \text{ ksi}} = 14.8 \text{ in}^3$
 $S_{xx} = 18.9 \text{ in}^3$

| | Depth | $S_x, X-X$ | $I_x, X-X$ | $S_y, Y-Y$ |
|--------------|---------------|-----------------------------|---------------|-------------|
| W 14 x 22 | 13.91" | 29.0 | 199.0 | 2.8 |
| MC 8 x 18.7 | 2.978" | 1.97 | 4.20 | 13.1 |
| <u>Total</u> | <u>16.89"</u> | <u>30.97 in³</u> | <u>203.20</u> | <u>15.9</u> |

BEAM DEFLECTION
 W 12 x 19 + MC 8 x 21.4

$$\Delta = \frac{5 W L^3}{384 EI} = \frac{5 (11.6 \text{ k} + 0.6 \text{ k} + 0.5 \text{ k}) (312 \text{ in})^3}{384 (29,000 \text{ Ksi}) (\text{in}^4)}$$

$$\Rightarrow \Delta = 0.8522 \text{ in}$$

$$\text{ALLOWED } \Delta = \frac{1}{360} \times L = \frac{1}{360} \times 312 \text{ in} = 0.8667 \text{ in}$$