

Direct Design Method:

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Uses a set of prescribed coefficients to distribute longitudinally the total factored static moment M_o .

Limitations:

- 1- Minimum of 3 continuous spans in each direction.
- 2- Rectangular and ratio (c/c) of spans ≤ 2.0 .
- 3- Successive span lengths (c/c) do not differ by more than $1/3$ of the longer span.
- 4- Offset of columns $\leq 10\%$ of span (in direction of offset).
- 5- Gravity loads only, uniform, service $LL \leq 2DL$
- 6- $0.2 \leq (L_1^2/\alpha_1) / (L_2^2/\alpha_2) \leq 5.0$

Example 16.7.1

Show that the limitations of the direct design method are satisfied for the two-way slab (with beams).

Limitations 1 to 4 are obviously satisfied.

Limitation 5: (service LL) \leq (2) \times (service DL)

$$\text{service DL, } W_D = \frac{17}{100} \times 2400 = 408 \text{ kg/m}^2$$

$$\text{service LL, } W_L = 690 \text{ kg/m}^2$$

$$\frac{W_L}{W_D} = \frac{690}{408} = 1.69 < 2$$

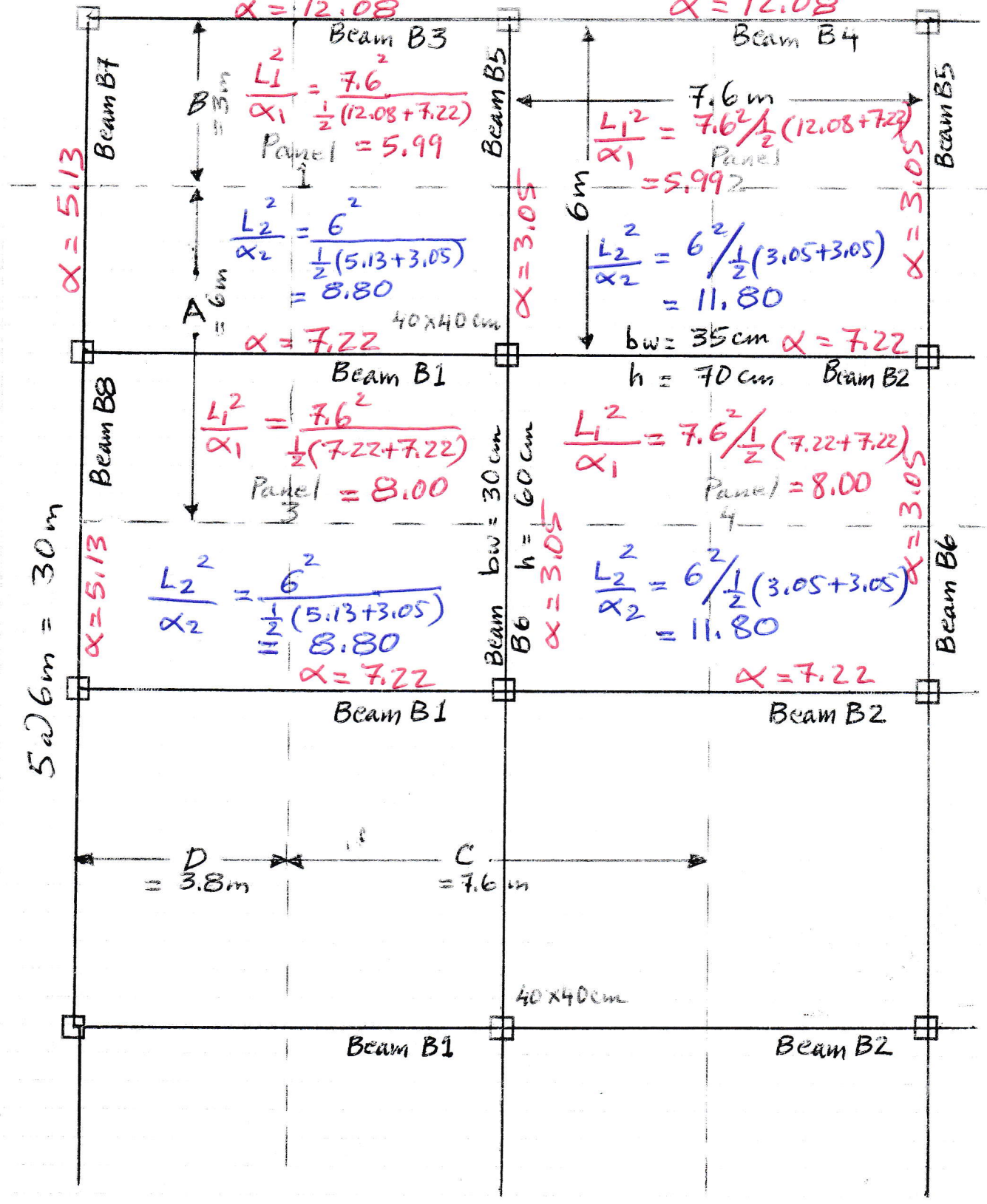
Limitation 6: All ratios of

$$\frac{L_1^2/\alpha_1}{L_2^2/\alpha_2} \text{ lie between 0.2 and 5.}$$

The calculations are shown on the following figures (plans).

Two-Way Slab with Beams: Example 16.7.1 (a)

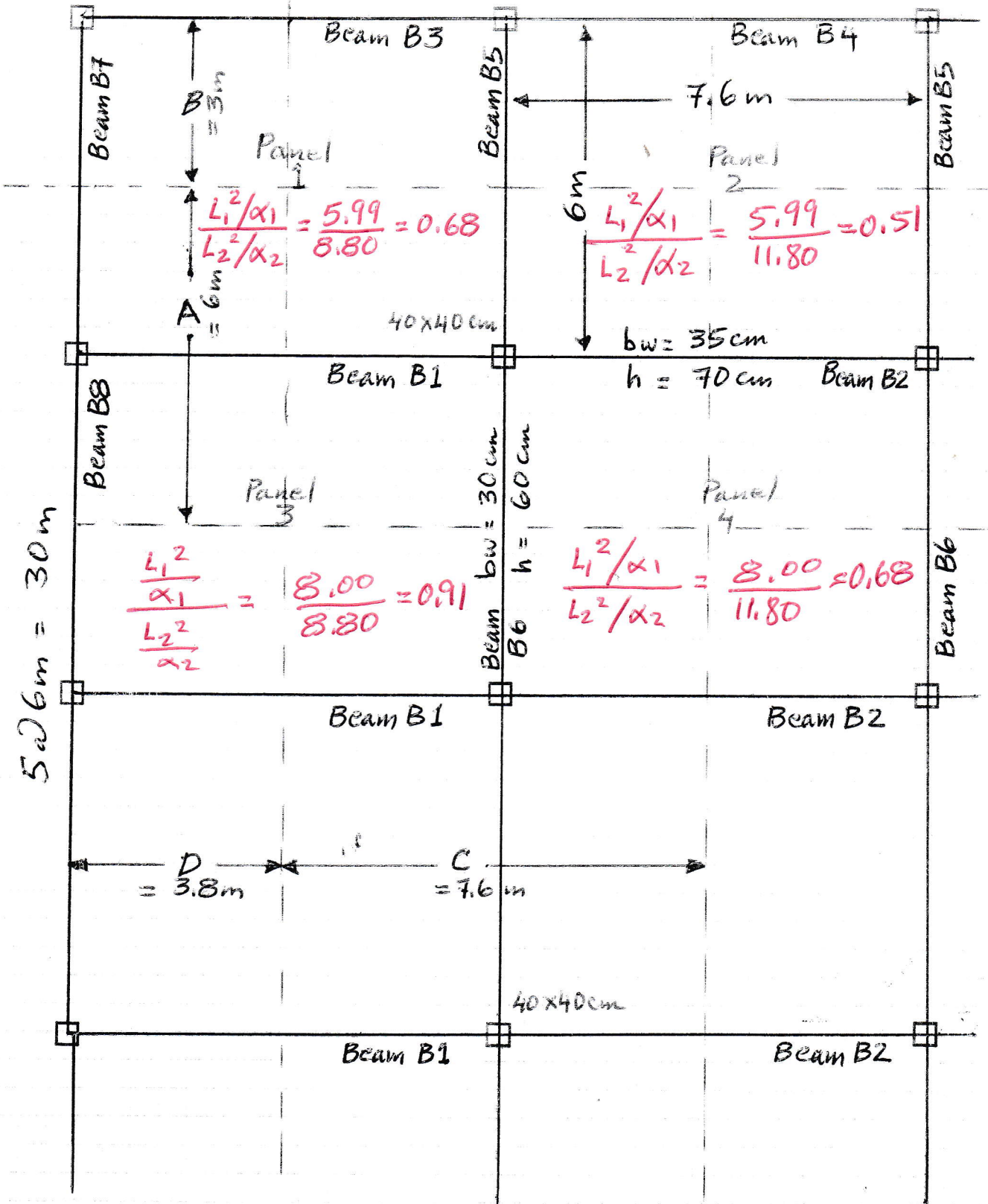
$5 \times 7.6 \text{ m} = 38 \text{ m}$



Slab = 17cm thick.

Two-Way Slab with Beams: Example 16.7.1(b)

$5 \times 7.6m = 38m$



Slab = 17cm thick.

All ratios of $\frac{L_1^2/\alpha_1}{L_2^2/\alpha_2}$ lie between 0.2 and 5.

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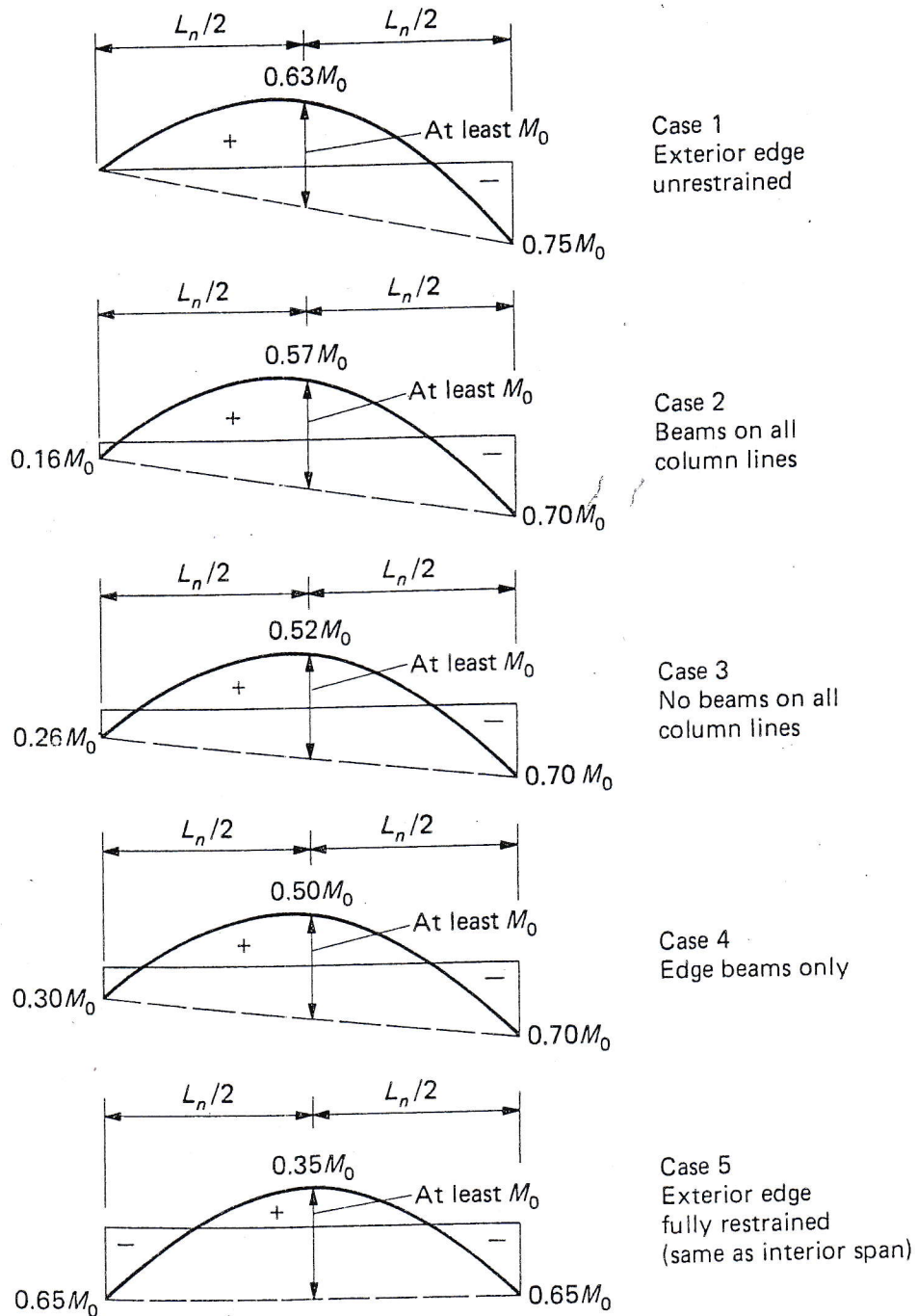


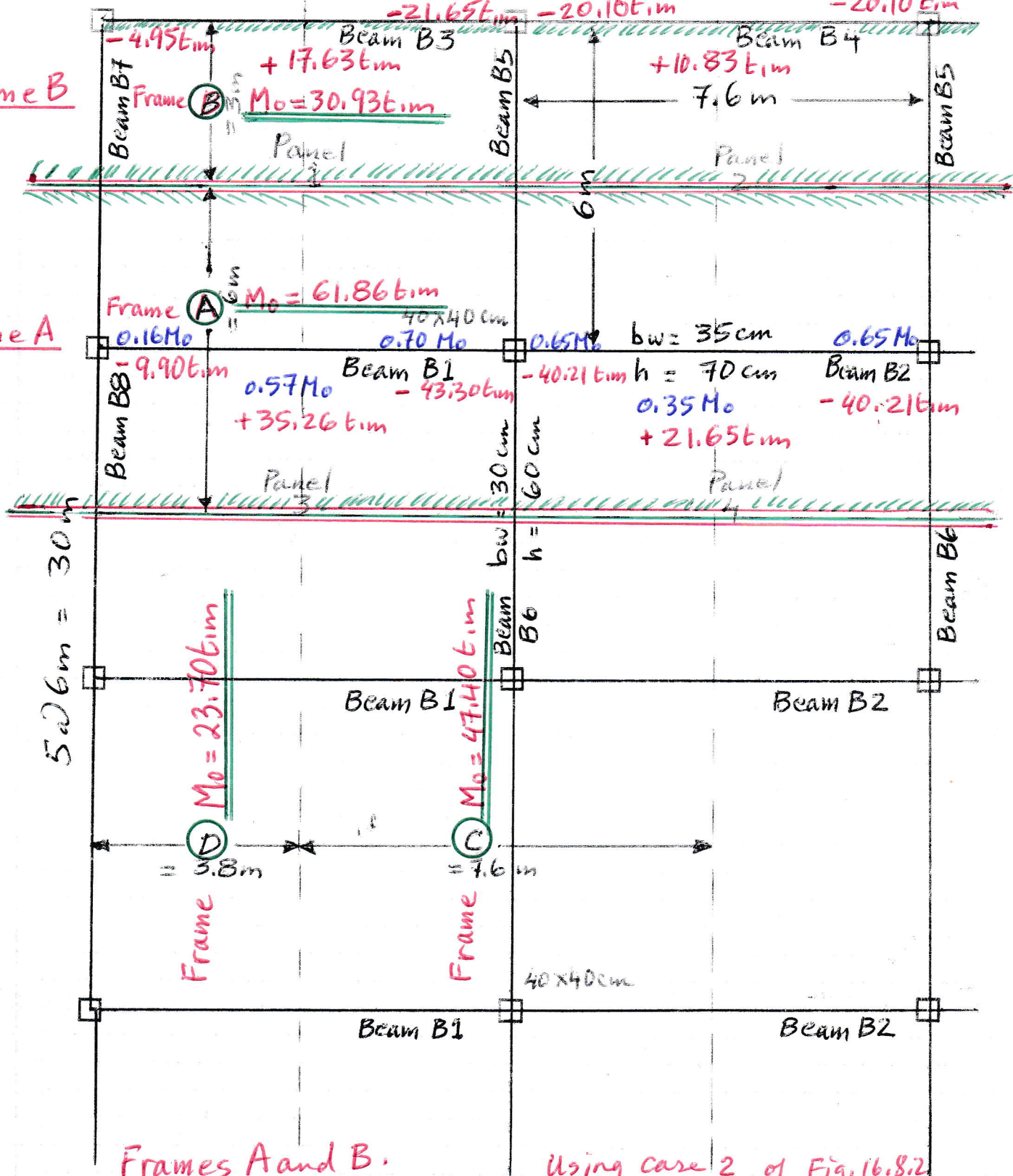
Figure 16.8.2 Longitudinal moment diagram for exterior span.

Two-Way Slab with Beams:

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$5 \times 7.6m = 38m$

Frame B



Frames A and B.

Using case 2 of Fig. 16.8.2 for the exterior span, and Fig. 16.8.1 for the interior span.

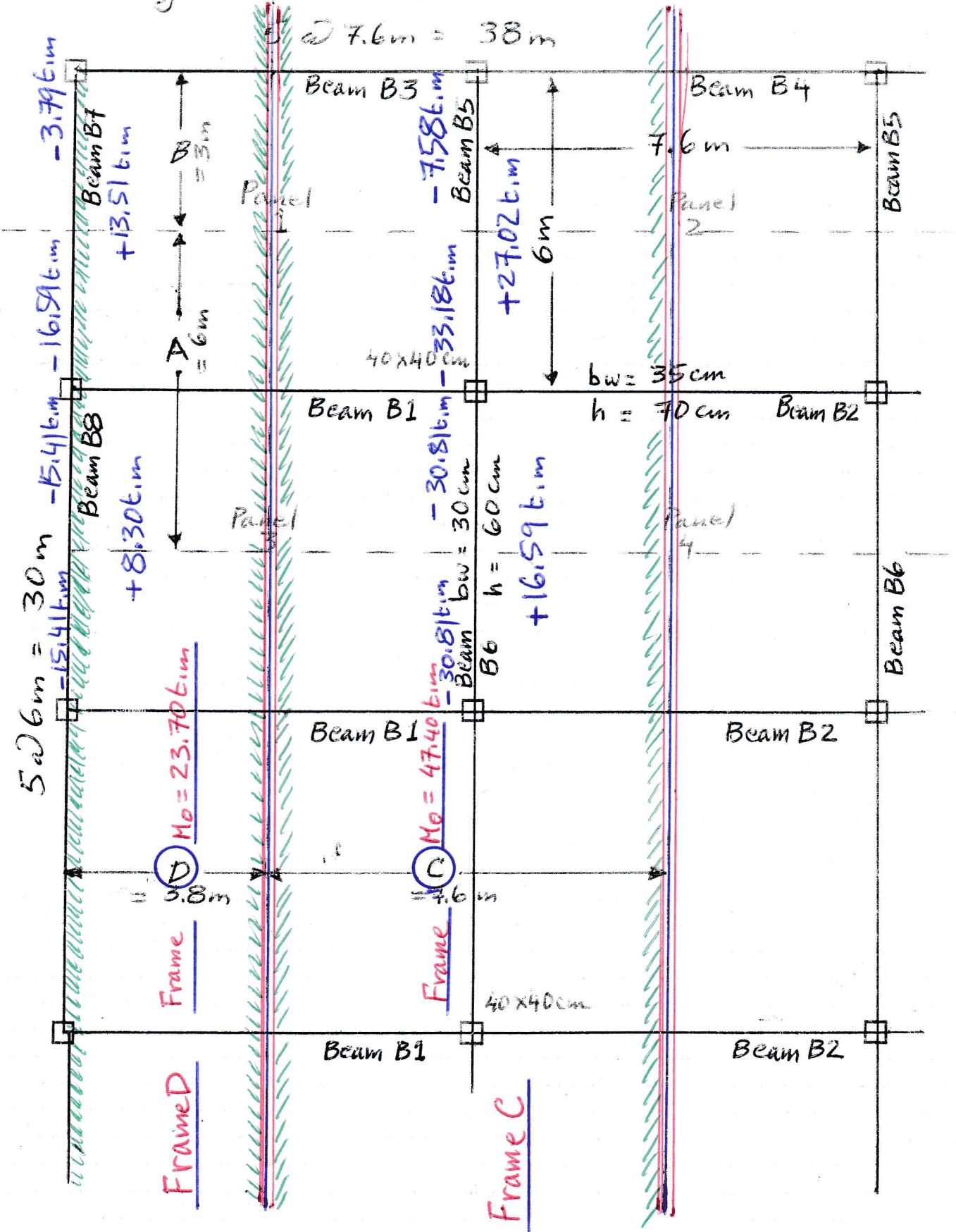
Slab = 17cm thick.

Example 16.10.1:

Determine the longitudinal moments in frames A, B, C, and D.

Two-Way Slab with Beams:

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Slab = 17cm thick.

Example 16.10.1: Frames C and D.