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GIVEN: 4 BOARDS EACH 1" x 6" GLUED AND NAILED AS A COLUMN SECTION.

A) DETERMINE ARRANGEMENT FOR THE STRONGEST SECTION.

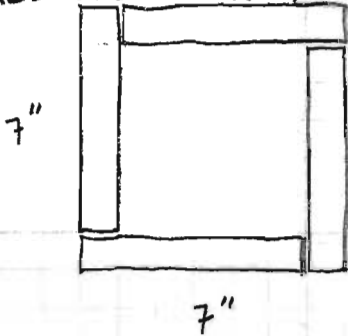
B) DETERMINE ALLOWABLE AXIAL LOAD FOR:
 $L = 10'-0"$ $20'-8"$ $30'-0"$
 BRACED AT ENDS ONLY

$$E = 1760000 \text{ PSI}$$

$$F_c = 1800 \text{ PSI}$$

$$f_c = \frac{3.60 E}{(l/r)^2} \quad \frac{l}{r} \leq 170$$

PLACING THE MATERIAL AS FAR AS POSSIBLE FROM THE N.A. RESULTS IN A 7" x 7" SQUARE



$$A = 4(6) = 24$$

$$I_x = I_y = \frac{7(7)^3}{12} - \frac{5(5)^3}{12} = 148.0$$

$$r = \sqrt{\frac{148}{24}} = 2.483$$

$$F = \frac{3.6 E}{(l/r)^2} = \frac{3.6 (1760000)}{l^2 / 2.483^2} = \frac{1}{l^2} (39072000) = \frac{P}{A}$$

$$P = \frac{1}{l^2} (937728000) \text{ lbs}$$

FOR $l = 10'-0"$:

$$l/r = 120/2.48 = 48.4 < 170 \quad \checkmark \text{ OK}$$

$$P_c = \frac{1}{120^2} (937728000) = 65120 \text{ lbs} \quad P_g = 1800(24) = \underline{\underline{43200 \text{ lbs}}}$$

FOR $l = 20'-8"$

$$l/r = 248/2.48 = 100 < 170 \quad \checkmark \text{ OK}$$

$$P_c = \frac{1}{248^2} (937728000) = \underline{\underline{15246 \text{ lbs}}} < 43200$$

FOR $l = 30'-0"$

$$l/r = 360/2.48 = 145.2 < 170 \quad \checkmark \text{ OK}$$

$$P_c = \frac{1}{360^2} (937728000) = \underline{\underline{7235 \text{ lbs}}} < 43200$$