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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:
   \[ L = 10' - 0" \quad 20' - 0" \quad 30' - 0" \]
   BRACED AT ENDS ONLY

\[ E = 1760000 \text{ psi} \]
\[ E_c = 1800 \text{ psi} \]
\[ f_c = \frac{3.60 E}{(48)^2} \]
\[ \frac{f}{f_c} \leq 170 \]

Placing the material as far as possible from the N.A. results in a 7" x 7" square.

\[ A = 4(6) = 24 \]
\[ I_x = I_y = \frac{7(7)^3}{12} - \frac{5(5)^3}{12} = 148.0 \]
\[ r = \frac{\sqrt{148}}{24} = 2.483 \]

\[ f = \frac{3.6 E}{(48)^2} = \frac{3.6 (1760000)}{242.483^2} = \frac{1}{242.483} (39072000) = \frac{p}{A} \]

\[ p = \frac{1}{242.483} (937728000) \text{ lbs} \]

For \( L = 10' - 0" \):

\[ \frac{p}{E} = \frac{120}{2.48} = 48.4 \leq 170 \quad \text{OK} \]
\[ P_c = \frac{1}{120^2} (937728000) = 65120 \text{ lbs} \]
\[ T_0 = 1800(24) = 43200 \text{ lbs} \]

For \( L = 20' - 0" \):

\[ \frac{p}{E} = \frac{248}{2.48} = 100 \leq 170 \quad \text{OK} \]
\[ P_c = \frac{1}{248^2} (937728000) = 15246 \text{ lbs} < 43200 \]

For \( L = 30' - 0" \):

\[ \frac{p}{E} = \frac{360}{2.48} = 145.2 \leq 170 \quad \text{OK} \]
\[ P_c = \frac{1}{360^2} (937728000) = 7235 \text{ lbs} < 43200 \]