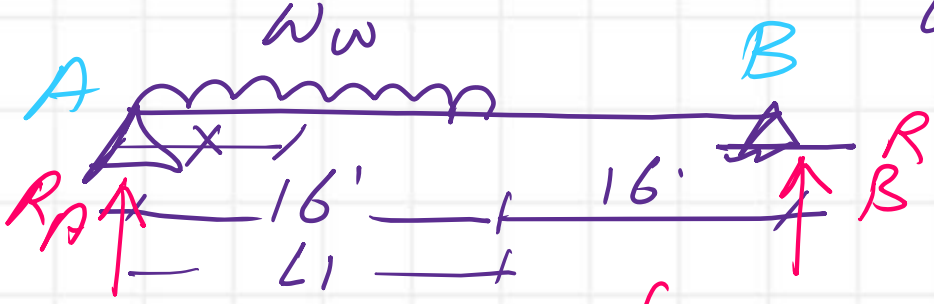
# For a partial Load at the Left

$W_w$ : working load




$$R_A = W_w(16)\left(\frac{24}{32}\right) = 12\,W_w$$

$$R_B = W_w(16)\left(\frac{8}{32}\right) = 4\,W_w$$

Check posfion of max. moment

$$\sum Q_x = 0$$

where $\frac{dM_x}{dx} = max$

$$R_A - W_w(x) = 0$$

$$12\,W_w = W_w\,x \rightarrow x = 12'$$

$$\frac{x}{L} = \frac{12}{32} = \frac{3}{8}L$$

$$M_x = R_A(x) - W_w\left(\frac{x^2}{2}\right)$$

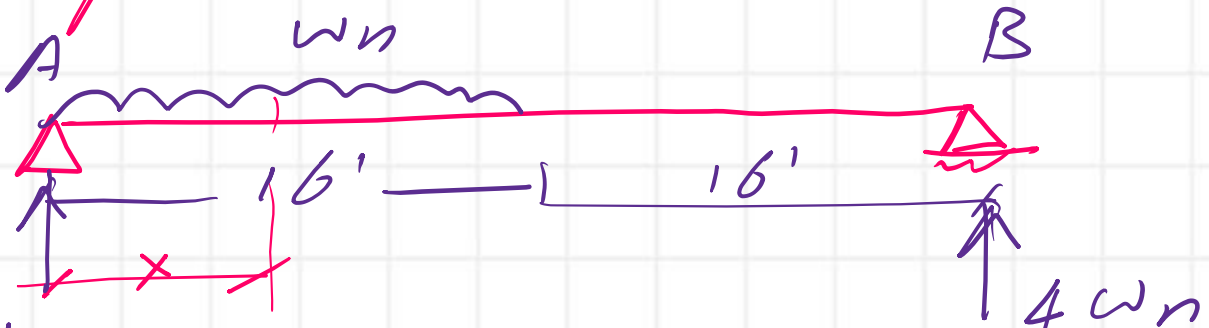
For $x = 12'$

where

$$M_{max} = 12w_w(12) - \frac{W_w}{2}(144) = 72\,W_w$$

For particL Load at the Left

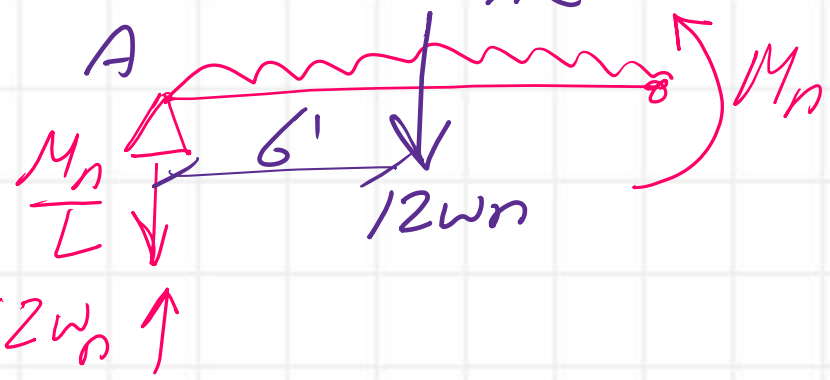
Collapse Load $\omega_n$




$R_A = 12\omega_n$

Again check at $x = 12'$ $Q_x = 0$

$12\omega_n - \omega_n(12) = 0$ ok




$\Sigma M_A = 0$

$12\omega_n (6) = M_n = 326.666$

$\omega_n = 4.537 \frac{kips}{FT}$

W18 X 40 $F_y = 50$ ksi: $Z_x = 78.40$ inch$^3$

but x distance

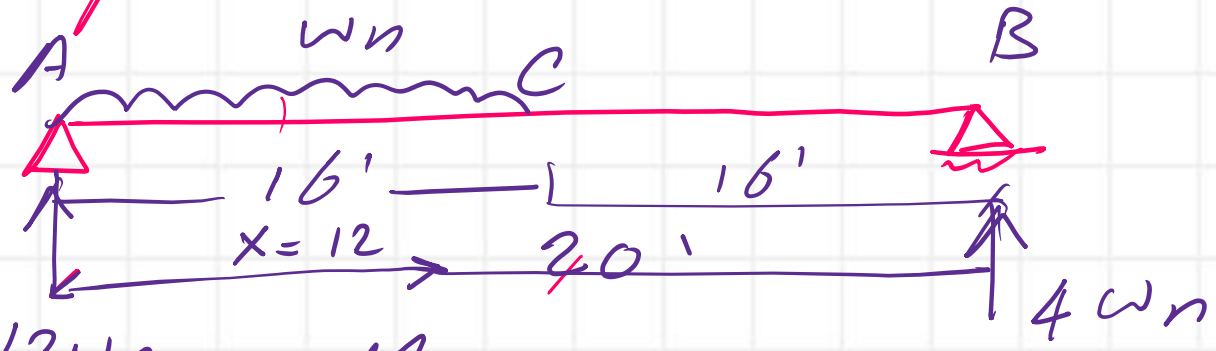
Can be found as follows

$M_p = F_y Z_x = 326.666$ FT. kips

$x = 12' \Rightarrow$ For $\omega_n$

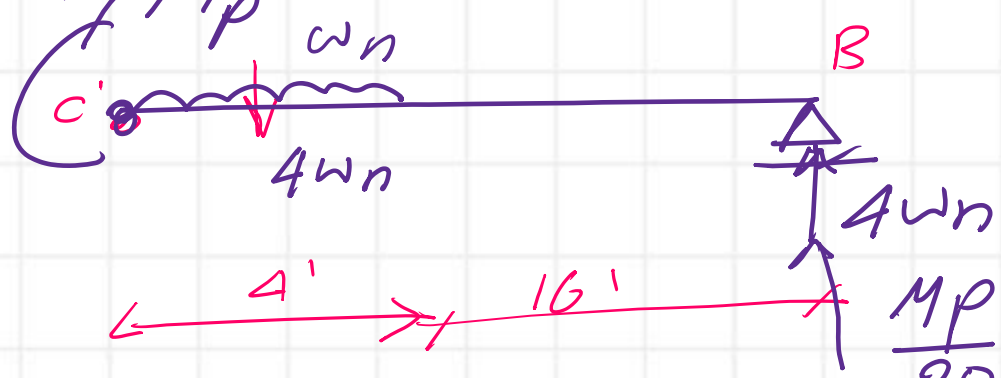
For particL Load at the Left

Collapse Load $\omega_n$




$R_A = 12\omega_n$

Check




W18 X 40 $F_y = 50$ ksi

$Z_x = 78.40$ inch$^3$

but x distance

Can be found as follows

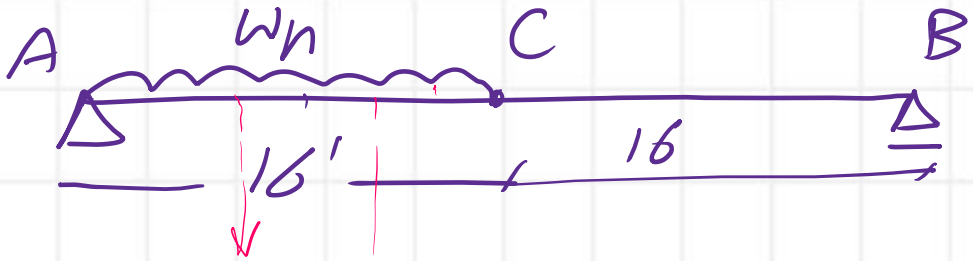
$M_p = F_y Z_x = 326.666$ FT. kips

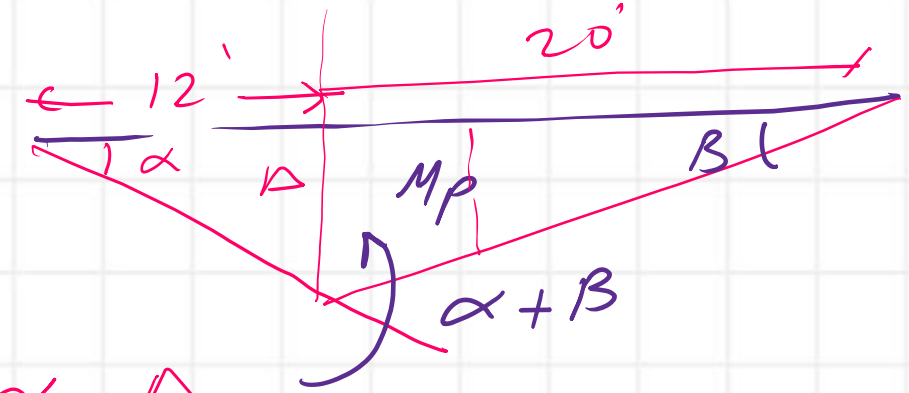
$\Sigma M_B = 0$

$4\omega_n(18) = M_p = 326.666$

$\omega_n = 4.537$ K/FT

# Using upper bound



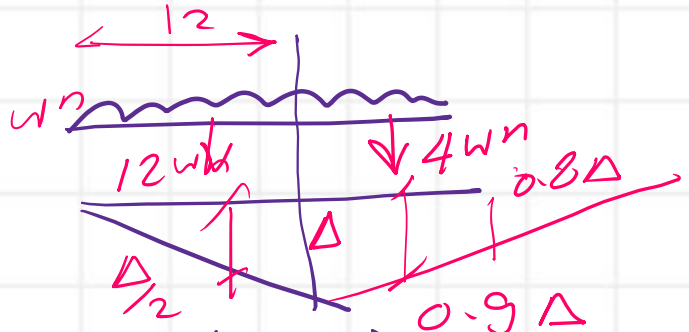

$\alpha = \frac{\Delta}{12}$

$\beta = \frac{\Delta}{20}$

$\alpha + B = \frac{32\,\Delta}{240}$

$M_p = 326.666$ Ft-kips

Treat as Two C. Loads ↖




$W_e = W_i$

$W_e = 12\,w_n \frac{\Delta}{2} + 4\,w_n (0.9\,\Delta)$

$W_e = 9.6\,w_n\,\Delta$

$W_i = M_p(\alpha + \beta)$

$9.6\,w_n\,\Delta = 326.666\left(\frac{32\,\Delta}{240}\right)$

$w_n = \frac{326.666(32)}{9.6\,(240)}$

$w_n = 4.537$ K/F

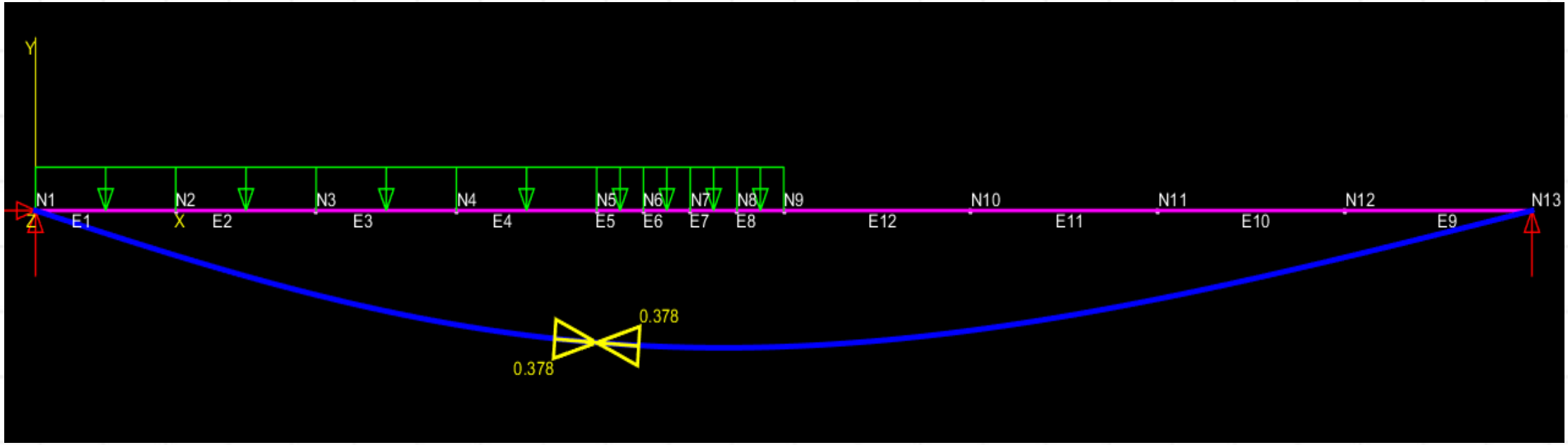
From MASTAN 2

W : 0.378 kip/inch

X 12 = 4.536 K/F

Our solution : 4.537 kip/FT

≈ 4.54 K/F

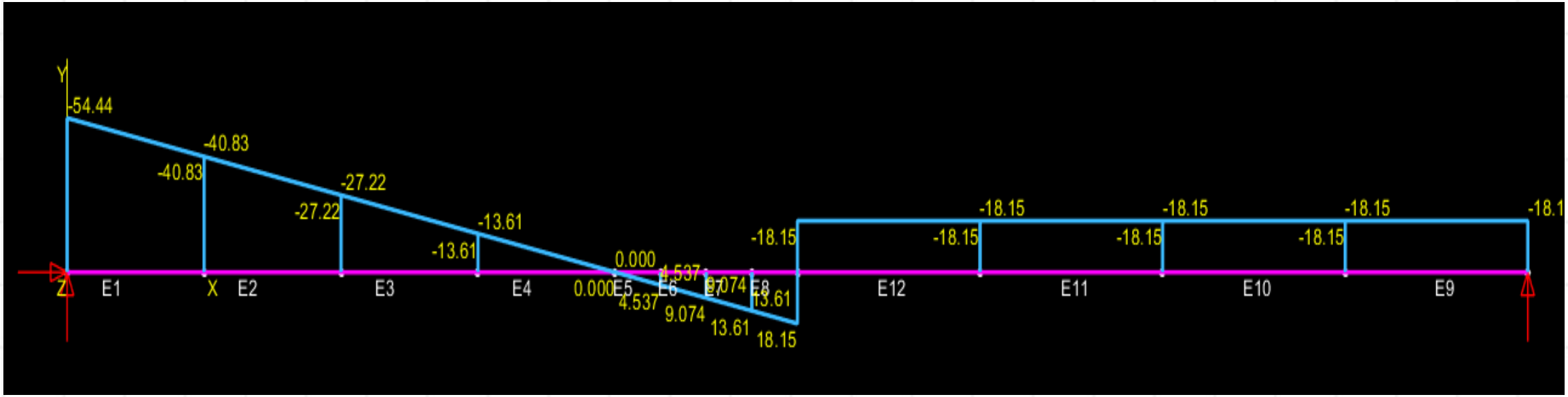


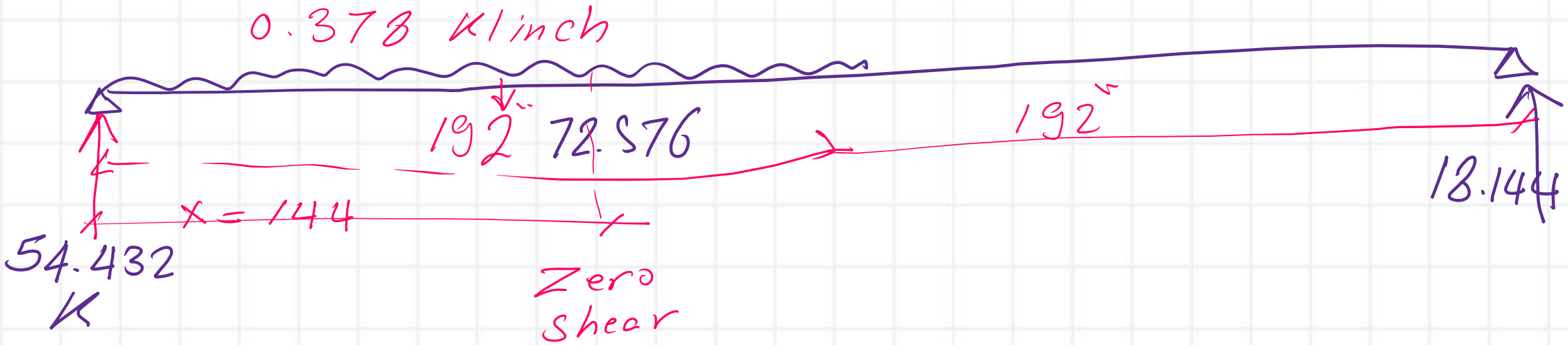

E = 29000 ksi

Fy = 50 ksi

X = 12' From left support

# Shear diagram $V_y$

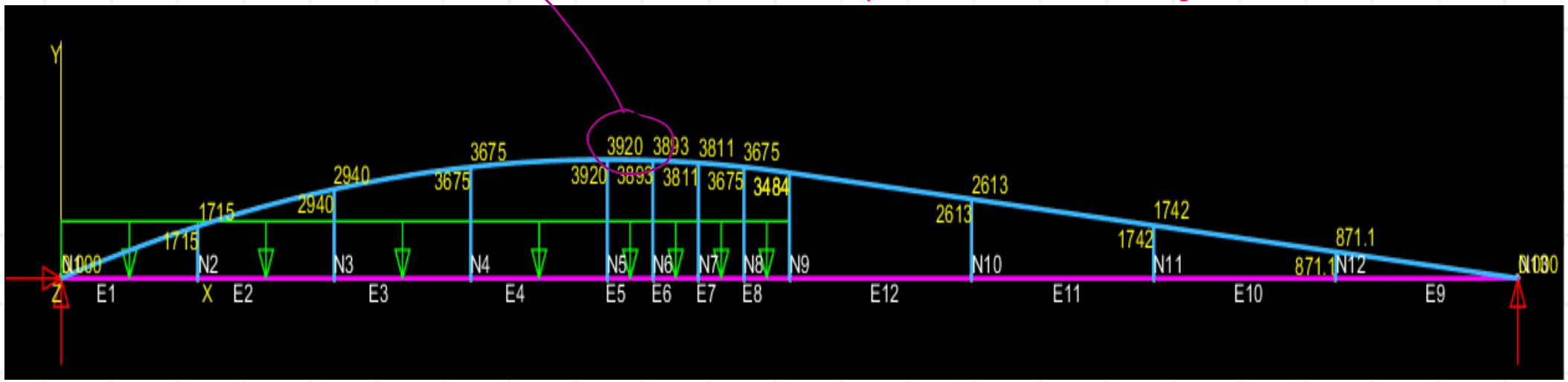


$M_p = 3920$ inch. kips $= Z_x F_y$

$F_y = 50$ ksi

B.M. Diagram




$W_w = 1.00$ k/inch

$W_n = 1.00\ \lambda$

Number of increment 100) max: 10

Fourth increment 0.10

0.378

ratio