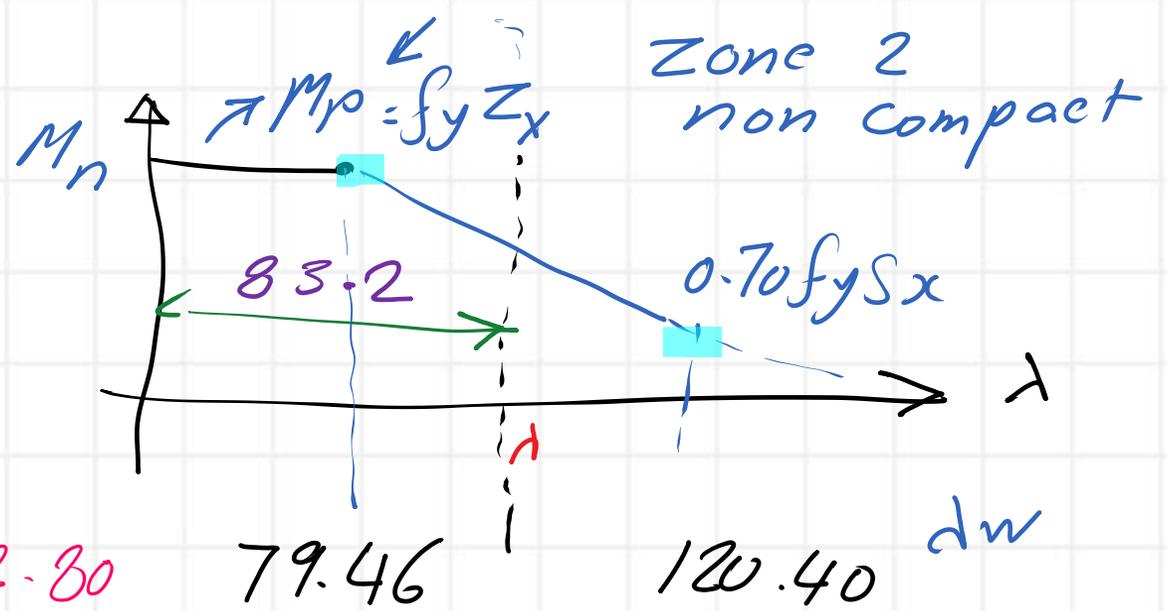
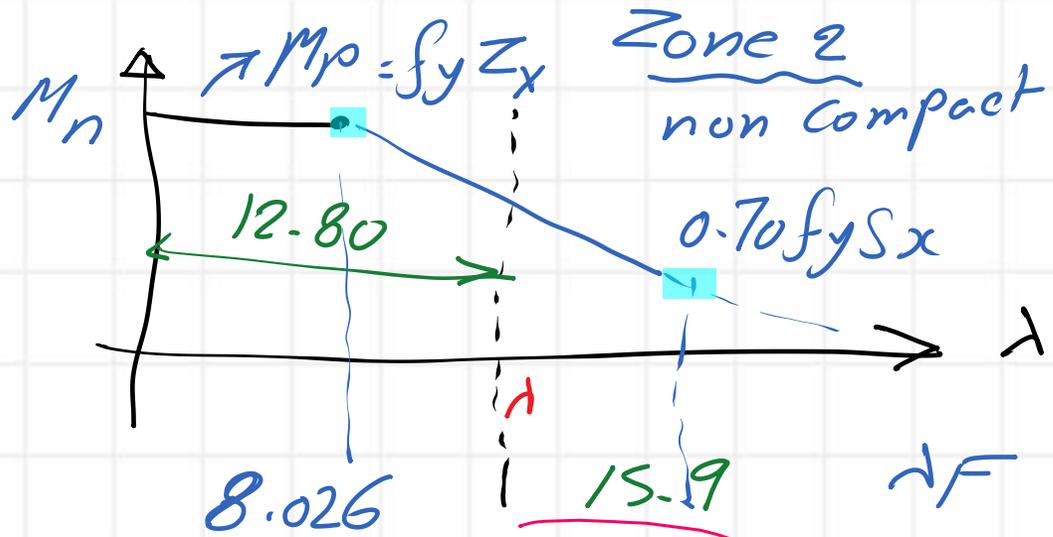
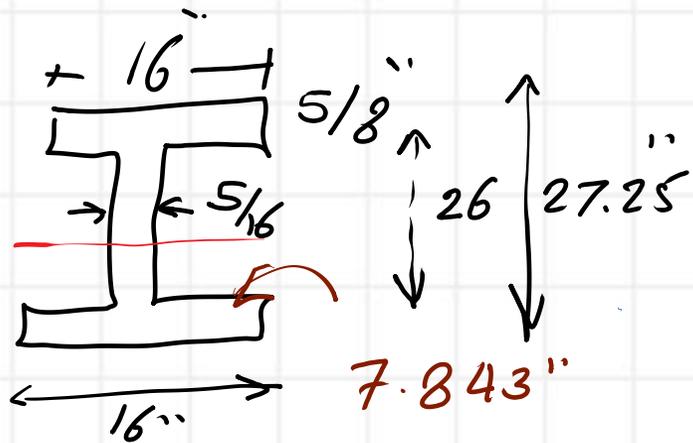


Post - 26 - Steel beam

- ① Determine Nominal moment For Flange
For non-Compact section
- ② Determine Nominal moment For Web
For non-Compact section



Requirement



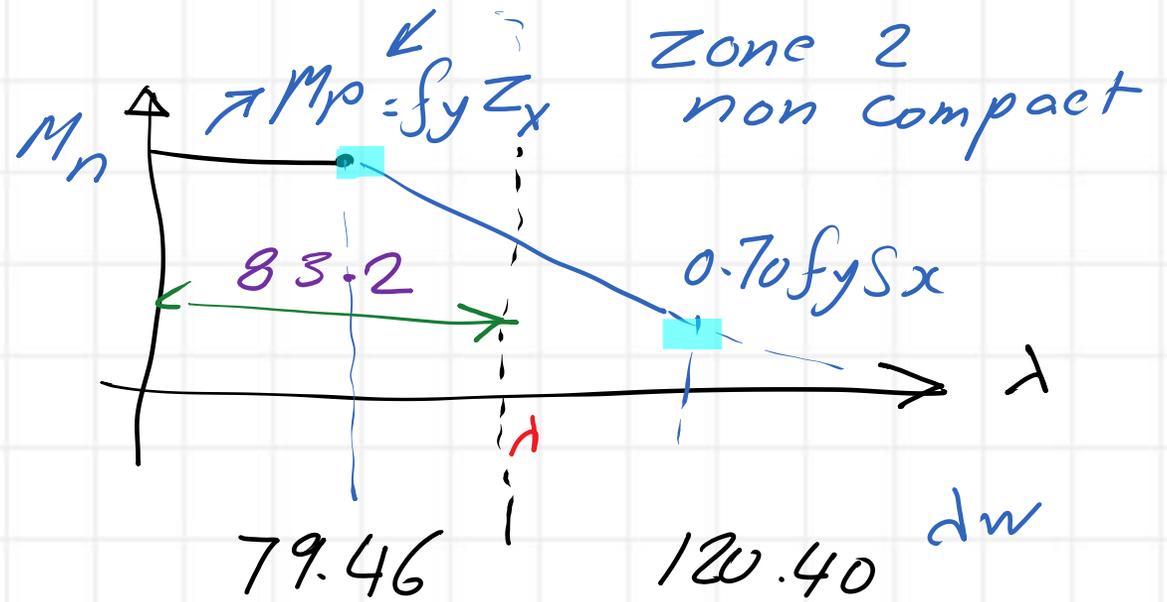
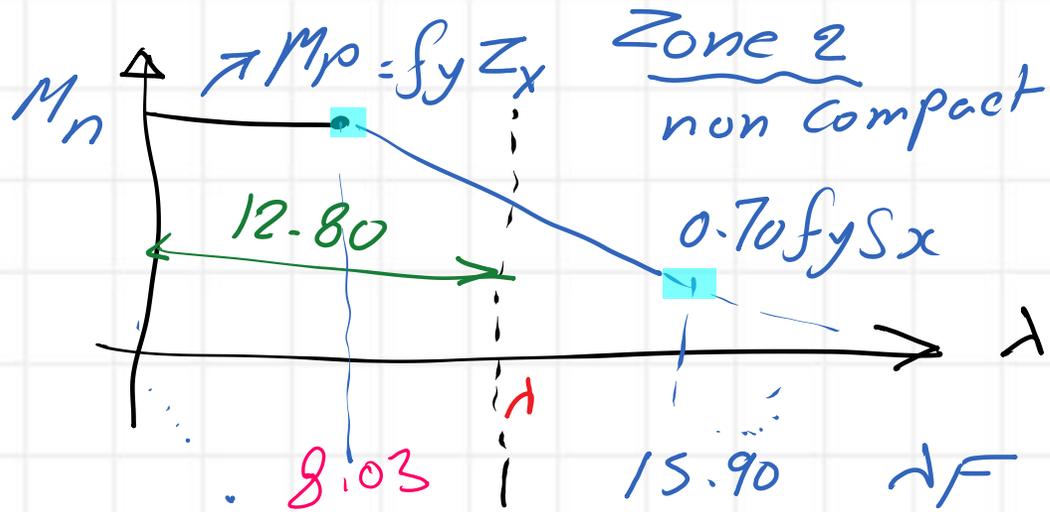
$$Z_x = 319.06 \text{ inch}^3$$

$$S_x = 293.78 \text{ inch}^3$$

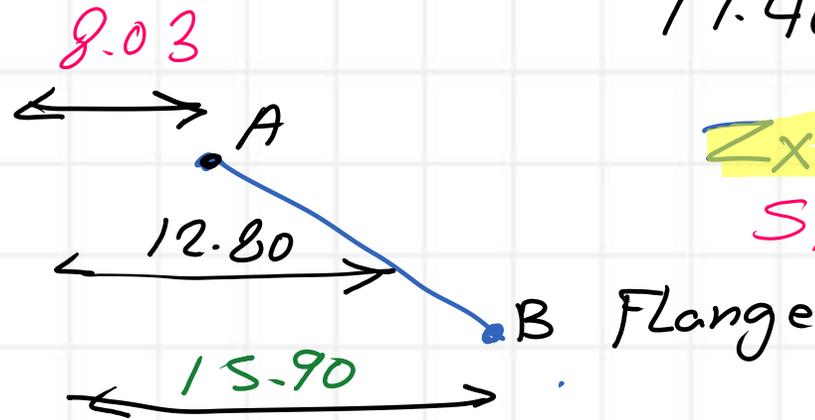
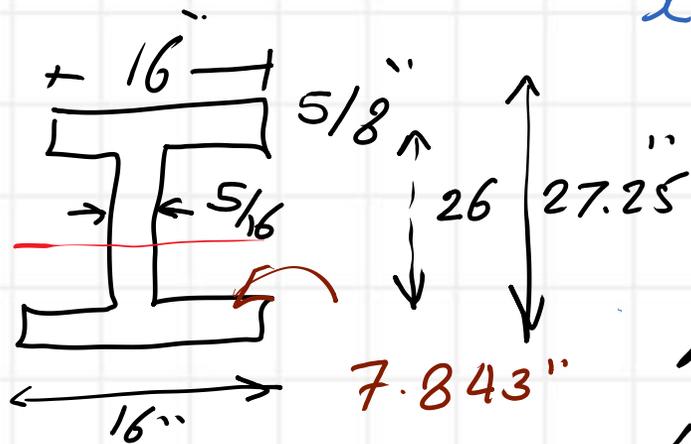
$$\approx 293.80 \text{ inch}^3$$

$$\Delta w = 83.70$$

Prepared by Eng. Maged Kamel.



Requirement



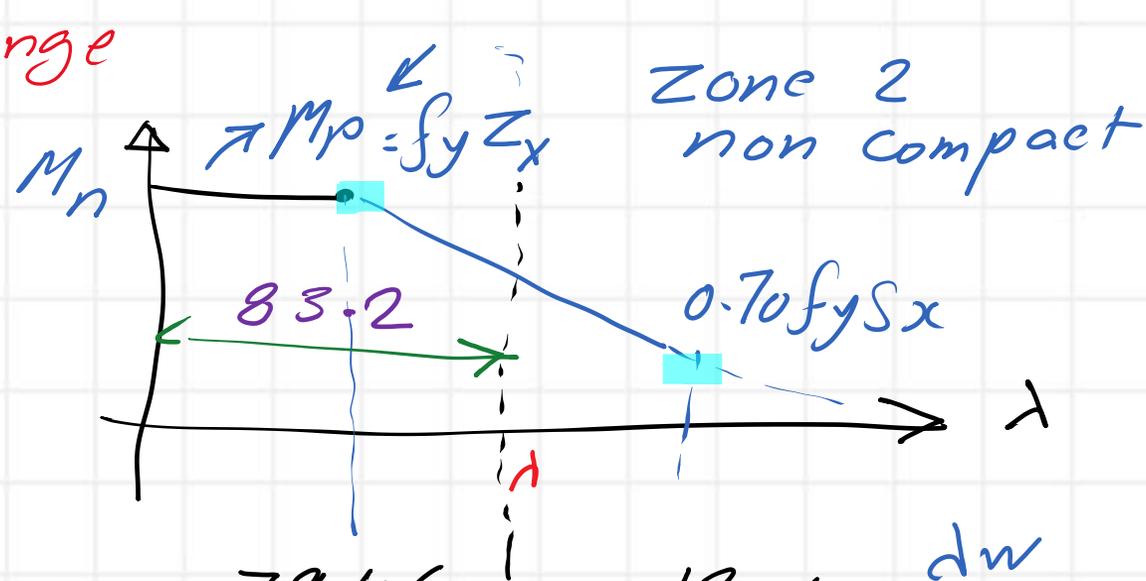
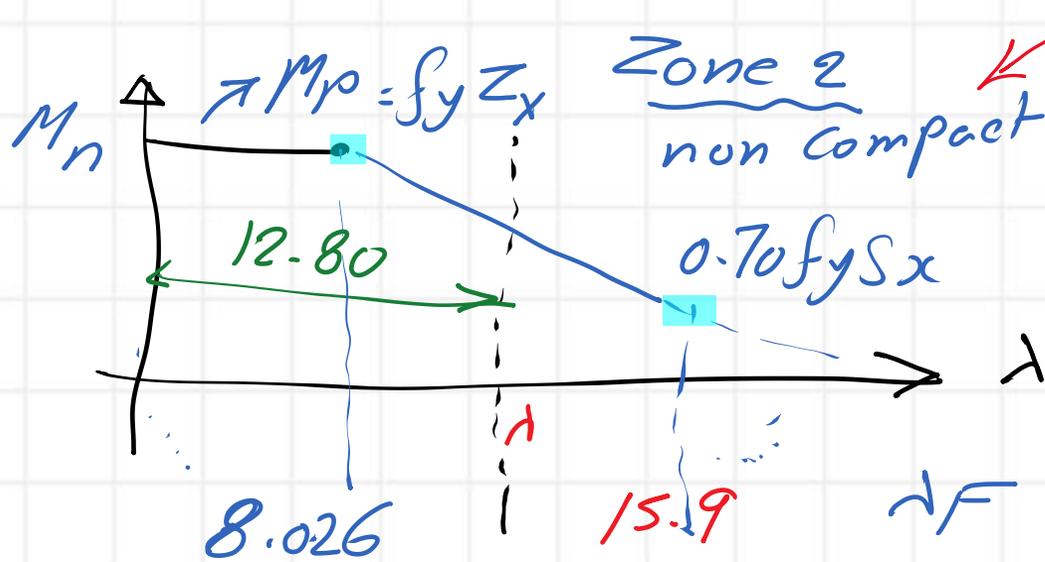
$Z_x = 319.06 \text{ inch}^3$
 $S_x = 293.80 \text{ inch}^3$

Mn For Flange

$$M_{nA} = f_y Z_x = 65(319.06) \left(\frac{1}{12}\right) = 1728 \text{ Ft kips}$$

$$M_{nB} = f_y(0.7) S_x = 65(0.70) \left(\frac{293.80}{12}\right) = 1114 \text{ Ft kips}$$

Prepared by Eng. Maged Kamel.

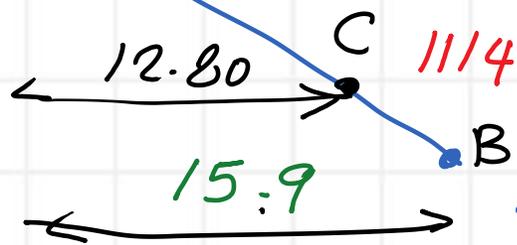
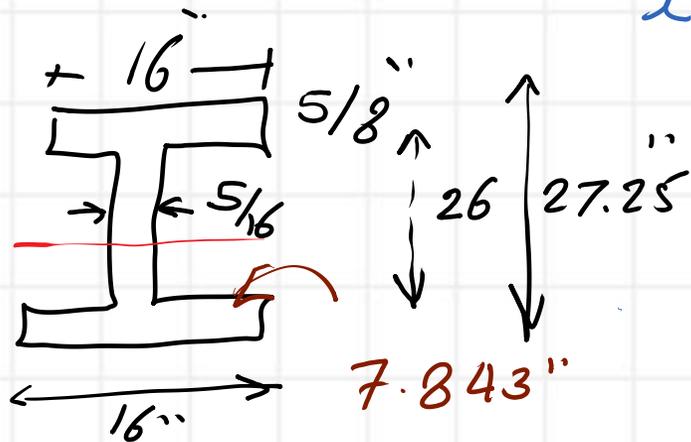


Requirement

Flange 8.03 ^{ft. kips} 1728

79.46 120.40 _{dw}

$Z_x = 319.06 \text{ inch}^3$



$S_x = 293.80 \text{ inch}^3$

Flange M_n

$$M_{nc} = 1728 - \frac{(1728 - 1114)(12.80 - 8.03)}{(15.9 - 8.03)} = 1355.85 \text{ Ft kips}$$

≈ 1355.90

Prepared by Eng. Maged Kamel.

slope	936.7102922	
lambda=bf/2df	Mn-inch kips	Mn-ft-kips
0	20738.9	1728.24
1	20738.9	1728
2	20738.9	1728
3	20738.9	1728
4	20738.9	1728
5	20738.9	1728
6	20738.9	1728
8.03	20738.9	1728
10	18893.58	1574
11	17956.87	1496
12.80	16270.79	1355.90
13	16083.45	1340
14	15146.74	1262
15	14210.03	1184
15.90	13366.99	1114

$$M_n = Z_x F$$



λF_P

$$b_f / 2 t_f = \lambda F$$

$$M_r = 0.7 F_y S_x$$

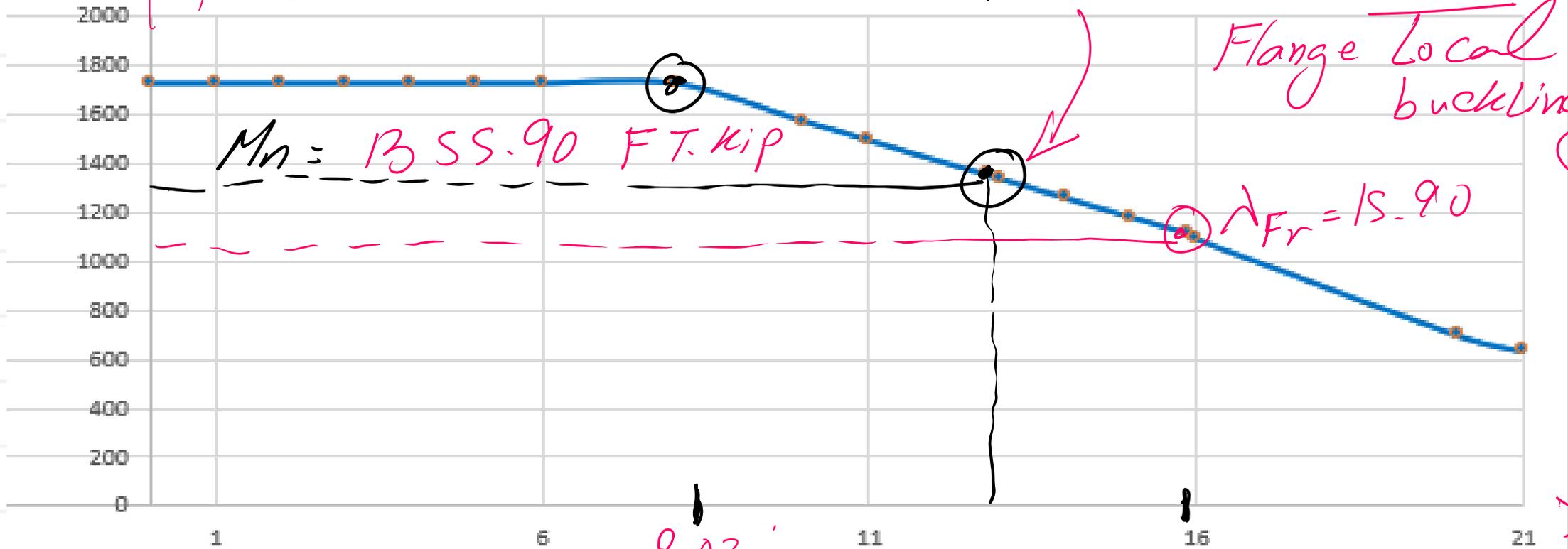
M_n ↑
 $\lambda_{Fp} = 8.03$

Chart Title

$\lambda_F = 12.80$

FLB

Flange Local buckling



$M_n = 13 \text{ SS.90 FT. kip}$

$\lambda_{Fr} = 15.90$

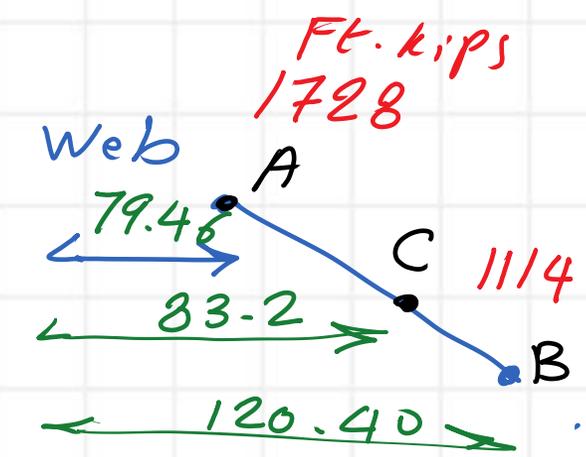
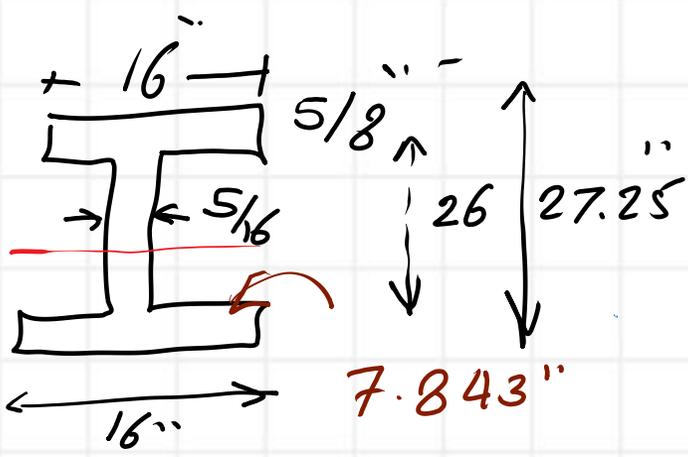
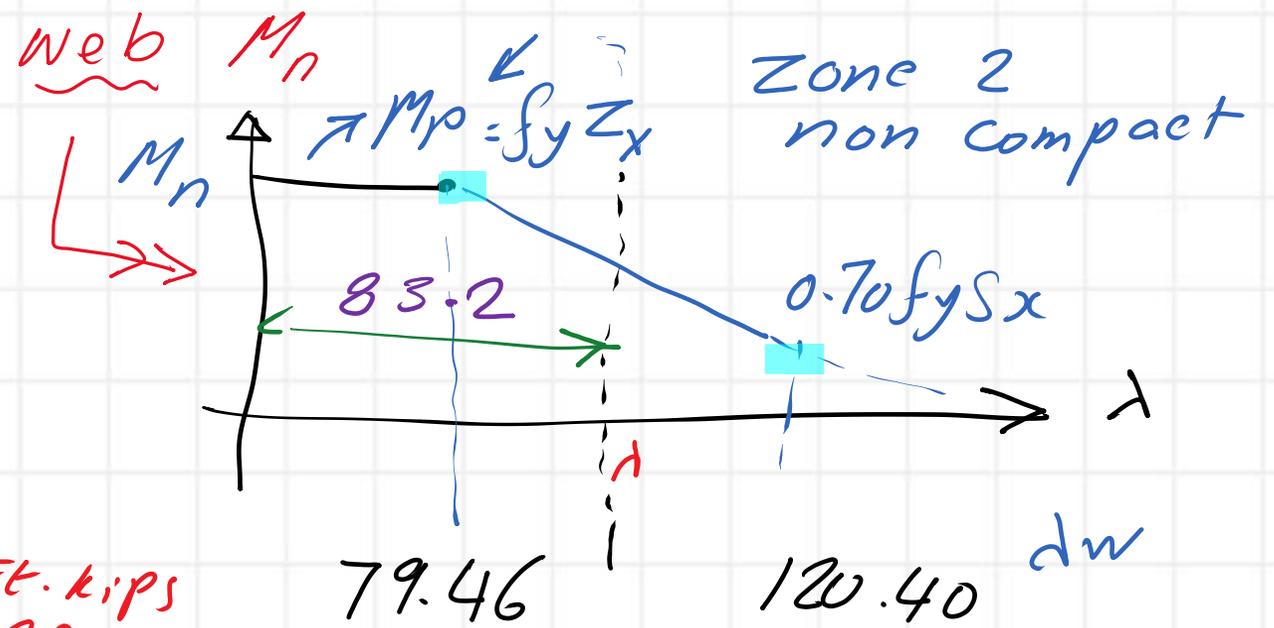
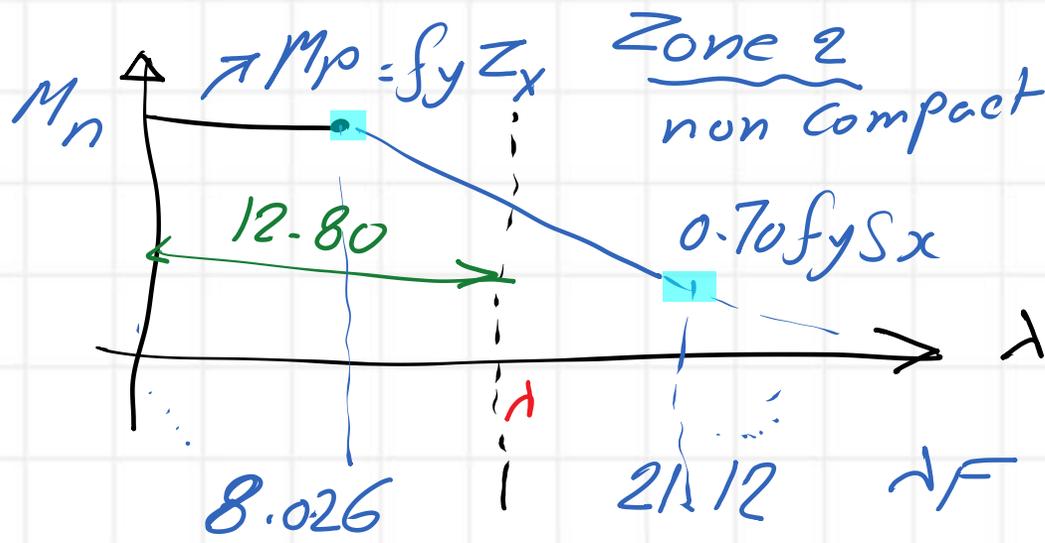
$\lambda_{Fr} = 15.90$

8.03
 λ_{Fp}

12.80
 $\frac{bf}{2t_f}$

λ_{Fr}

$\lambda = \frac{bf}{2t_f}$



$Z_x = 319.06 \text{ inch}^3$

$S_x = 4003 / 13.625 = 293.80 \text{ inch}^3$

Web M_n

$$M_{nc} = 1728 - \frac{(1728 - 1114)(83.2 - 79.46)}{(120.40 - 79.46)} = 1672 \text{ Ft-kips}$$

Prepared by Eng. Maged Kamel.

$\lambda = h/t_w$	Mn-inch kips	Mn-ft-kips
0	20738.9	1728.24
20	20738.9	1728.24
30	20738.9	1728.24
40	20738.9	1728.24
50	20738.9	1728.24
60	20738.9	1728.24
70	20738.9	1728.24
79.42	20738.9	1728.24
80	20634.56	1719.55
82	20274.75	1689.56
83.20	20058.86	1671.57
84	19914.94	1659.58
90	18835.52	1569.63
100	17036.48	1419.71
105	16136.97	1344.75
106	15957.06	1329.76
115	14337.93	1194.83
120.40	13366.99	1113.92

$Z_x F_y$



N_{wp}

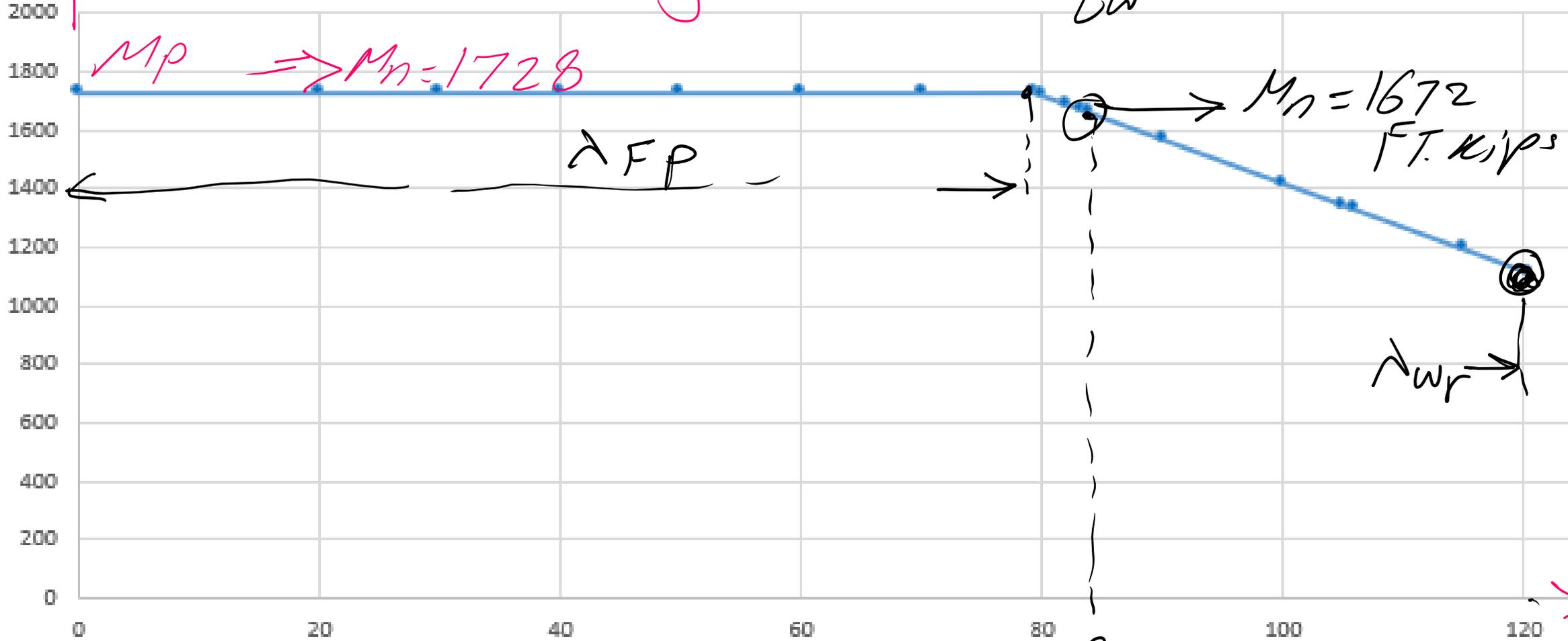
$\left(\frac{h}{t_w}\right)$

N_{wr}

M_n ↑ WLB
web local buckling

Chart Title

$$\frac{h}{t_w} = 83.2$$



Prepared by Eng. Maged Kamel.

$$\lambda = \frac{h}{t_w}$$

