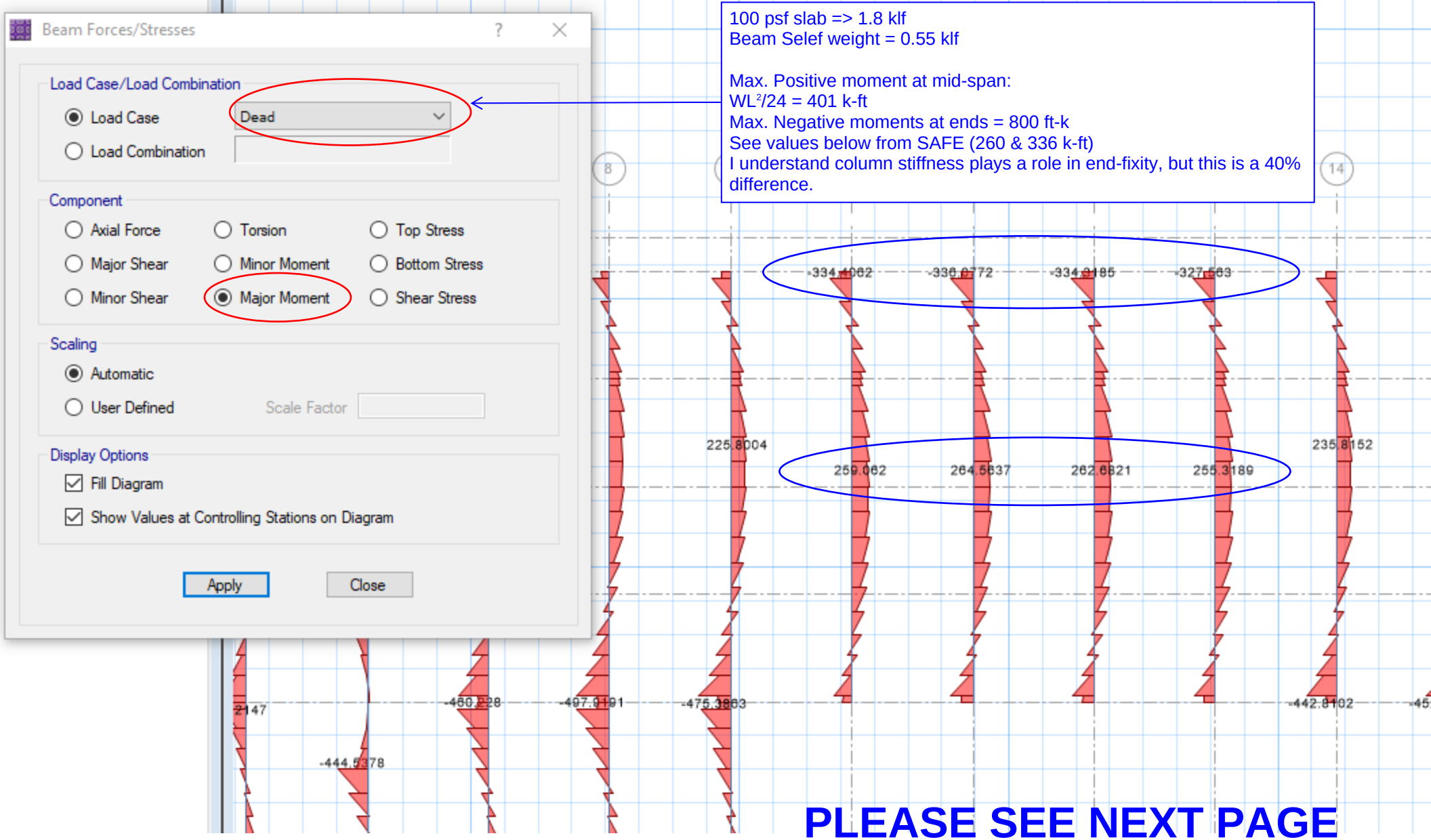
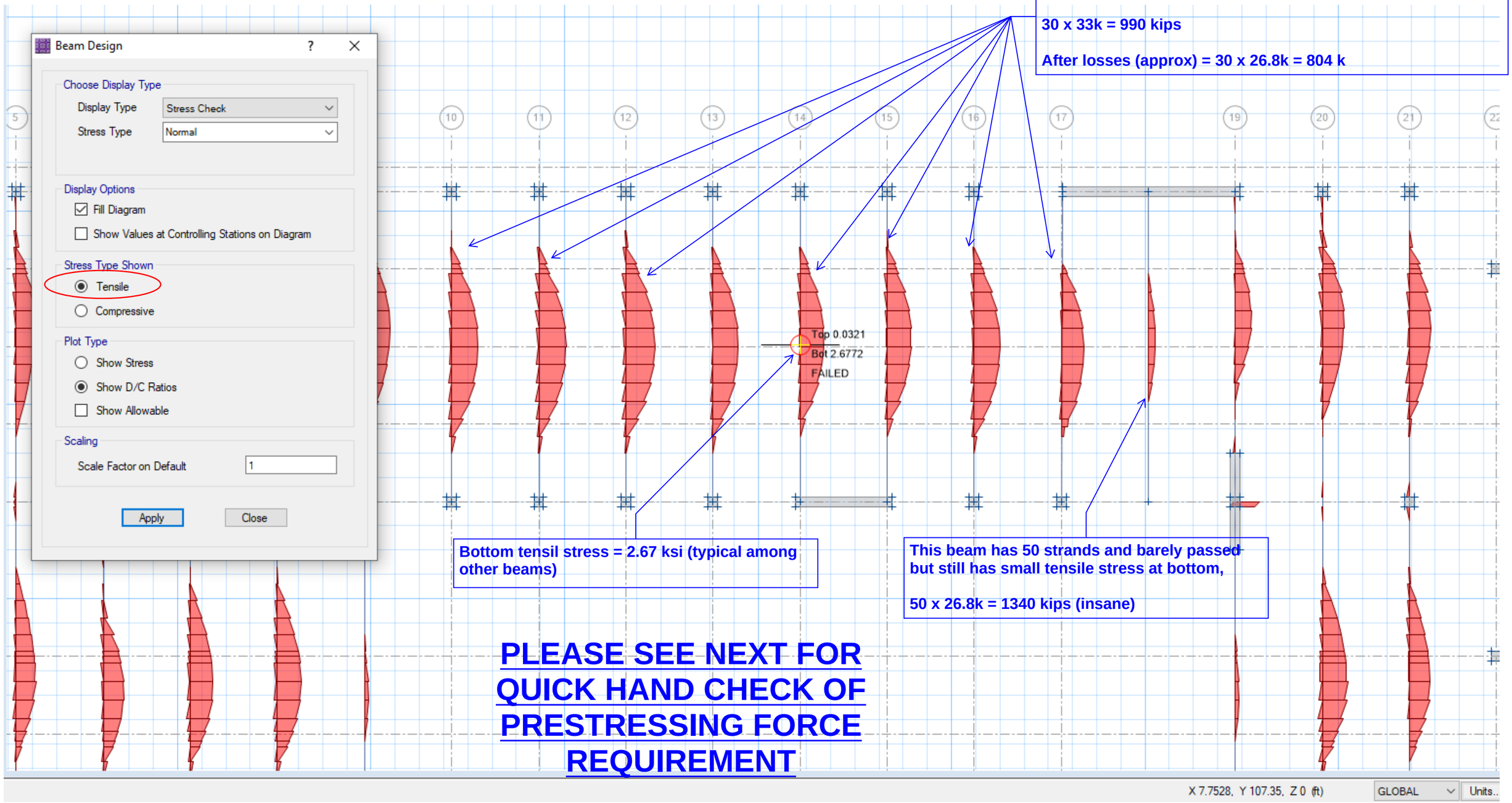


PLEASE SEE NEXT PAGE FOR PRE-STRESSING INFORMATION


Beam Design
Choose Display Type
Display Type
Stress Check
Stress Type
Normal
Display Options
Fill Diagram
Show Values at Controlling Stations on Diagram
Stress Type Shown
Tensile
Compressive
Plot Type
Show Stress
Show D/C Ratios
Show Allowable
Scaling
Scale Factor on Default
1
Apply
Close
Top 0.0321
Bot 2.6772
FAILED
Beams have 30 strands, so initial prestressing force of approx:
30 x 33k = 990 kips
After losses (approx) = 30 x 26.8k = 804 k
Bottom tensil stress = 2.67 ksi (typical among other beams)
This beam has 50 strands and barely passed but still has small tensile stress at bottom,
50 x 26.8k = 1340 kips (insane)
PLEASE SEE NEXT FOR QUICK HAND CHECK OF PRESTRESSING FORCE REQUIREMENT
X 7.7528, Y 107.35, Z 0 (ft)
GLOBAL
Units..

JOB

SHEET NO. OF

CALCULATED BY DATE

CHECKED BY DATE

SCALE

SELF WT = $\frac{(14" \times 38")}{144} \times 150\ pcf = 0.554\ KLF$

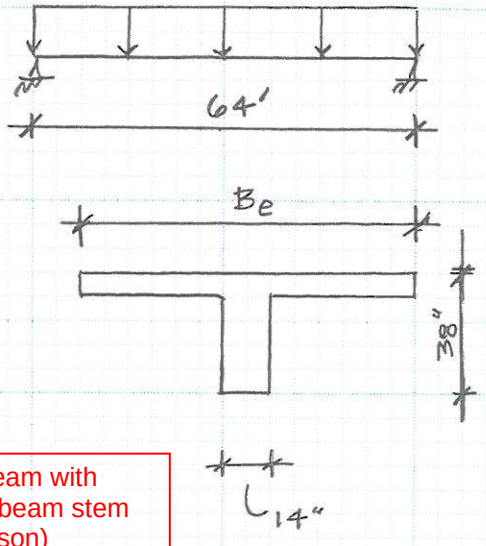
$W_D = 18' \times 110\ psf = 1.98\ KLF$

$W_L = 18' \times (45\ psf + 15\ psf) = 1.08\ KLF$

$B_e = 64'/4 = 16'$

$= \frac{18'}{2} = 9'$ ← GOVERNS

$= 24(8") + (14" \times 8") = 25.33'$



I also checked beam with effective width = beam stem only (for comparison)

SECTION PROPERTIES:

$A = (14" \times 30") + (108" \times 8") = 1284\ in^2$

$I_{gross} = 138130\ in^4$

$y_{top} = 10.21"$; $y_{bot} = 27.78"$

$S_t = \frac{138130}{10.21"} = 13529\ in^3$ $S_b = \frac{138130}{27.78"} = 4972\ in^3$

This moment is much larger (Dead + Live) than program calculated, which is 376 k-ft (for D+L)

MAX MID-SPAN MOMENT $= \frac{(1.98+1.08)(64^2)}{24} = 522.2^{k\text{-}ft}$

$\sigma_{top} = \frac{My_t}{I} = \frac{(522 \times 12"')(10.21")}{138130} = +0.463\ ksi\ (COMP)$

$\sigma_{Bott.} = \frac{(522 \times 12)(27.78")}{138130} = -1.26\ ksi\ (TENSION)$

See next page for prestressing force

JOB _____

SHEET NO. _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____

ALLOWABLE TENSILE STRESS IN CONC. $= 7.5\sqrt{f_c'}$ (UNCRACKED)

(ACI 24.5.2)

$= 474$ psi

$$f_t = -\frac{F}{A} - \frac{Fe}{S_b} + \frac{M}{S_b}$$

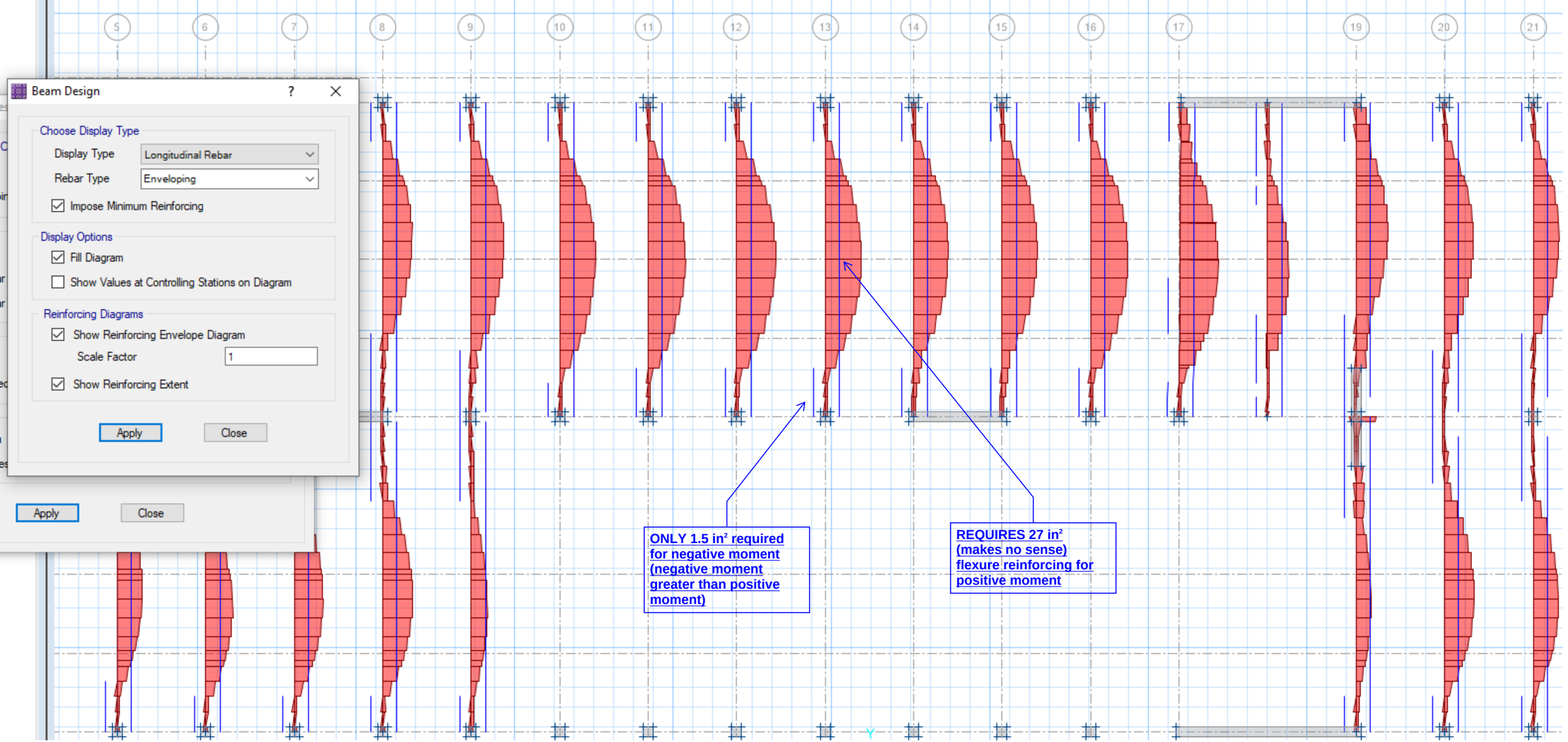
$$0.474 = \frac{-F}{1284} - \frac{F(23.8")}{4972} + \frac{522 \times 12}{4972}$$

$$-0.786 \text{ ksi} = \frac{-4972F - 30559F}{(1284)(4972)}$$

$$F = 141^{K}$$

I re-checked beam stem only (no slab considered for effective width), and this load increased to 202K (still much smaller than program required)

PLEASE SEE NEXT PAGE FOR FLEXURE (NON-PRESTRESSED) REINFORCING REQUIREMENTS


Beam Design
Choose Display Type
Display Type
Longitudinal Rebar
Rebar Type
Enveloping
Impose Minimum Reinforcing
Display Options
Fill Diagram
Show Values at Controlling Stations on Diagram
Reinforcing Diagrams
Show Reinforcing Envelope Diagram
Scale Factor
1
Show Reinforcing Extent
Apply
Close
ONLY 1.5 in² required for negative moment (negative moment greater than positive moment)
REQUIRES 27 in² (makes no sense) flexure reinforcing for positive moment