Generalized equation for equivalent post-tensioning load

The moment due to post-tensioning is

Where P(x) is the force in the tendon and e(x) is the eccentricity at any location x.

Recall that

And the derivative of a product is

Therefore

If is assumed to be constant

If is assumed to be linear

If the tendon is a parabola with sag “a” from x=0 to x=L with the low point at x=L/2

For a constant P and a parabolic tendon

For a linear P and a parabolic tendon

If the tendon is a parabola starting at x1 with elevation a1 and ending at x2 with elevation a2 with the slope of the parabola equal to zero at one end

For a constant P and a parabolic tendon

For a linear P and a parabolic tendon

If the tendon is linear between points x1 and x2 the eccentricity between x1 and x2 is

For a constant P and a linear tendon

For a linear P and a linear tendon