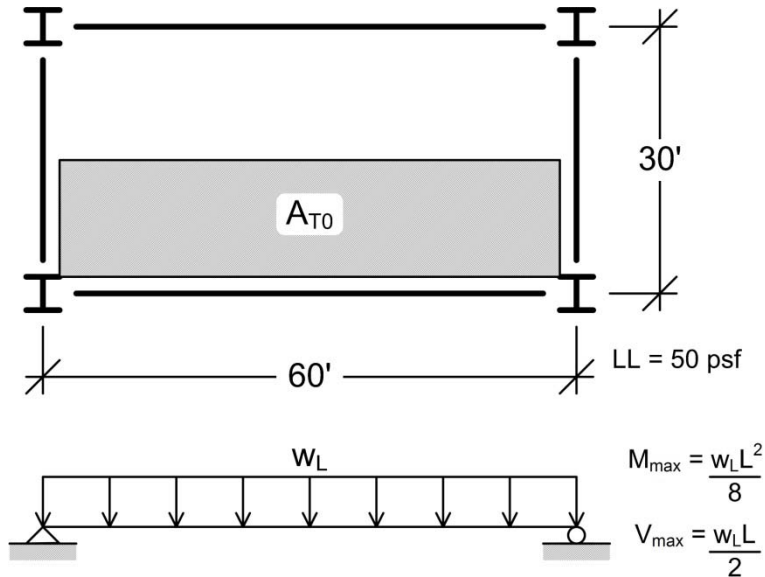


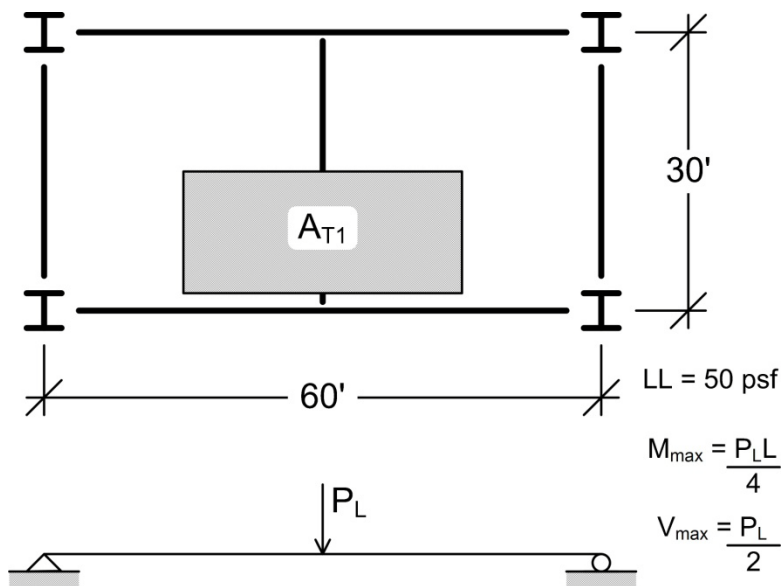
**Problem 4. Tributary area and live loads on girders.**

Finding the tributary area for girders can be a particular source of confusion for students. Let's do some more examples.

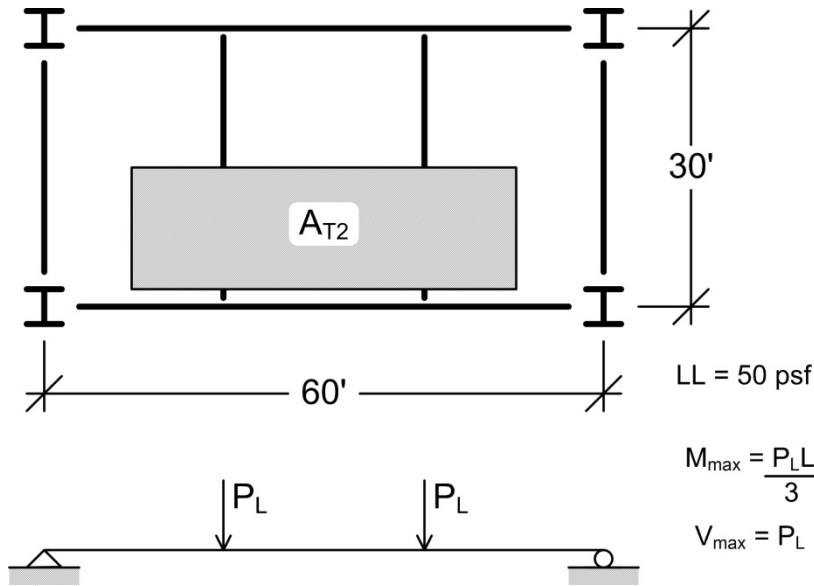
**a)** For the structure shown below with no interior beams, find the tributary area and live load reduction factor for the bottommost girder (some helpful equations are provided). Find *both the reduced and unreduced* peak shear and moment due to the live load.



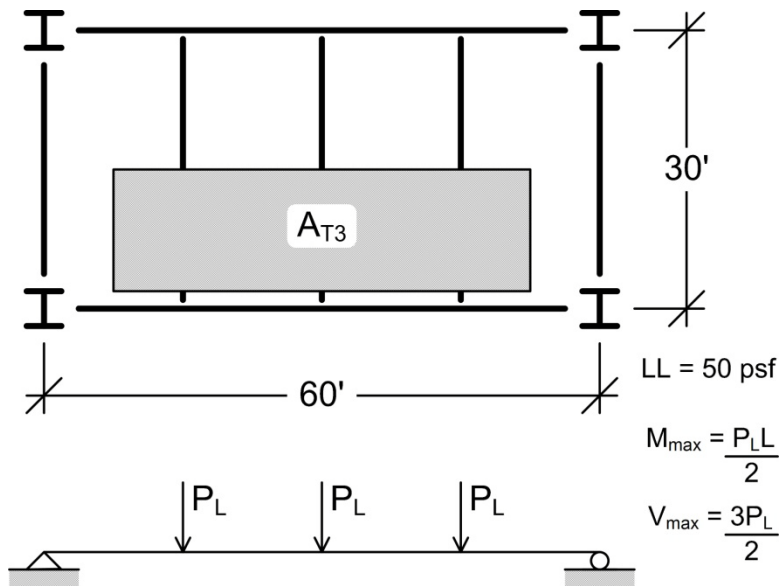
**b)** For the structure shown below with one interior beam, find the tributary area (smaller than part a!) and live load reduction factor for the bottommost girder (some helpful equations are provided). Find *both the reduced and unreduced* peak shear and moment due to the live load.



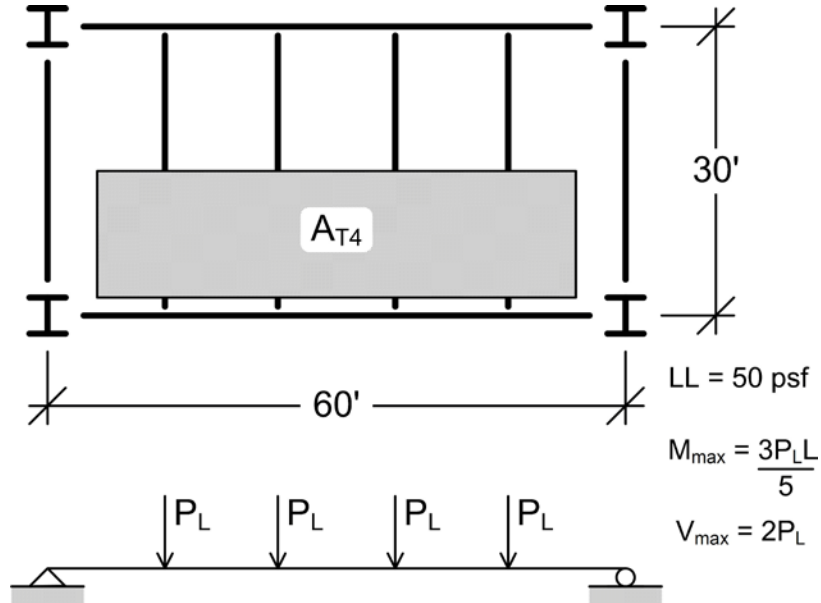
c) For the structure shown below with two interior beams, find the tributary area (larger than part **b**, but less than **a**) and live load reduction factor for the bottommost girder (some helpful equations are provided). Find *both the reduced and unreduced* peak shear and moment due to the live load.



d) For the structure shown below with three interior beams, find the tributary area (larger than part **c**, but less than **a**) and live load reduction factor for the bottommost girder (some helpful equations are provided). Find *both the reduced and unreduced* peak shear and moment due to the live load.



e) For the structure shown below with three interior beams, find the tributary area (larger than part **d**, but less than **a**) and live load reduction factor for the bottommost girder (some helpful equations are provided). Find *both the reduced and unreduced* peak shear and moment due to the live load.



f) Plot the trend for both the unreduced and reduced maximum shears and moments for cases **b-e**.

g) What kind of errors might you see in parts **b**, **c**, **d**, and **e** if you were to use the live load reduction factor calculated using the tributary area from part **a** rather than the correct live load reduction factor for each case? Are they conservative or unconservative errors? How large of an error of this kind might you be willing to tolerate?