

Part 1 – Spreadsheet:

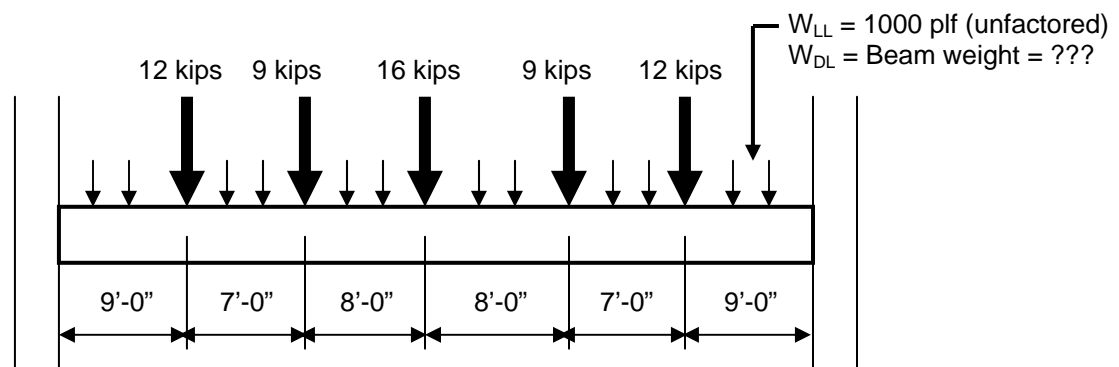
Prepare an Excel spreadsheet that uses formulas to calculate the “Usable Moment Capacity” of a rectangular concrete beam using various arrangements of tension steel. Prepare one set of calculations BY HAND (word processed) that must correspond to the spreadsheet results. Be sure to check that the values of ρ_{actual} is between ρ_{min} and ρ_{max} (i.e., $\rho_{\text{min}} \leq \rho_{\text{actual}} < \rho_{\text{max}}$), so it is possible that some steel configurations may be Not Applicable.

The hard-copy of the spreadsheet and hand-calculations must be turned in, plus the spreadsheet must be e-mailed to me at hultendc@delhi.edu

Part 2 – Shear Design:

Refer to the beam loading diagram below (all of the point loads are already factored). Be sure to add the appropriate FACTORED beam weight in addition to the loads already shown. Using the same beam as in Part 1, and assuming 3 - #8 tension bars, do the following (word processed):

1. Calculate the maximum FACTORED moment on the beam, and state whether or not the concrete beam is adequate based on flexure based upon the calculated the “Usable Moment Capacity” as determined in your spreadsheet.
2. Determine the stirrup requirements for the concrete beam. Assume only one spacing of stirrups at where stirrups are required.



$f'_c =$ _____ ksi Steel $f_y =$ _____ ksi Concrete cover = _____ " Stirrup bars = #3	<h2>Rectangular Concrete Beam Capacity</h2>					
Tension Bars:	Beam width "b":	Beam height "h":	Depth to tension bars "d":	Area of tension bars "A_s" (in²):	Phi actual (A_s/bd):	Usable Moment Capacity "M_u" (kip-ft):
2 - #4						
2 - #5						
2 - #6						
2 - #7						
2 - #8						
2 - #9						
3 - #4						
3 - #5						
3 - #6						
3 - #7						
3 - #8						
3 - #9						
4 - #4						
4 - #5						
4 - #6						
4 - #7						
4 - #8						
4 - #9						

