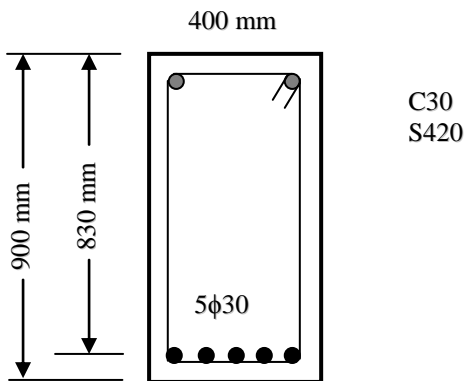


Çankaya University
 Department of Civil Engineering
 CE 382 Reinforced Concrete Structures
 2014 Spring Semester

Homework Assignment No. 1. Date due: March 20, 2014.

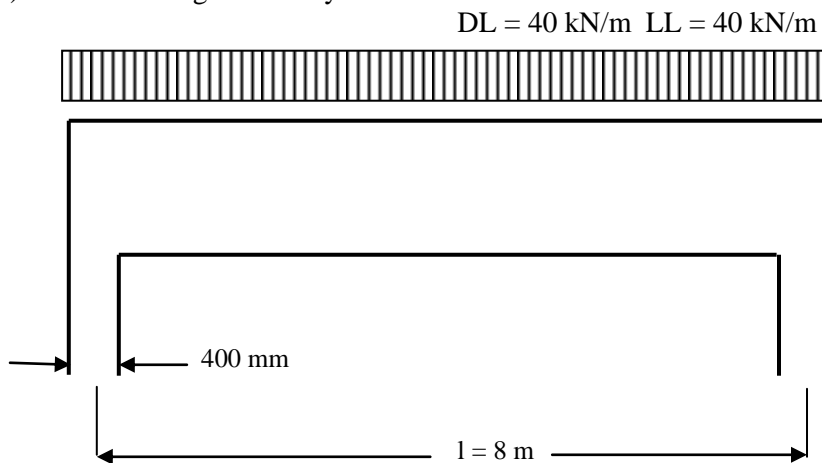
1. A typical cross section is shown. Consider an effective depth of 830 mm. Material properties are shown. You may at this stage ignore the temperature (compression) steel and the stirrups.

- (a) Calculate the factored moment resistance for the beam cross section
- (b) Check whether the amount of reinforcement meets the TS500 requirements



2. A simply supported rectangular RC beam supports a uniform dead load (DL) of 40 kN/m (including self weight), and a live load (LL) of 40 kN/m. The beam width is restricted to 400 mm. Assume $\phi 10$ stirrups and $\phi 24$ bars for tension steel. The beam is located in the interior of a building. The materials are C25 and S420.

- (a) Find the required overall beam depth and the amount of tension reinforcement so that the beam can carry the design loads while the reinforcement ratio at the mid-span is $\rho \leq 0.75\rho_b$.
- (b) Provide a design summary.



3. The beam in Prob. 2 must be designed now for 0.75 times the depth you have found. Use $\phi 10$ stirrups and $\phi 28$ bars for longitudinal steel. Now provide compression steel so that the beam is capable of carrying the imposed loads. Make sure that TS500 requirements are met. Provide a design summary and a comparison of the two designs.