

## CE 481 TERM PROJECT of Fall 2012

### Topic 1

You will write a moment curvature analysis program for T-beams. The program should adopt the layer by layer approach and find neutral axis depth to establish force equilibrium for each imposed top fiber concrete strain as we discussed in class.

The program should allow the user to input geometry of the section, number of concrete layers, number of steel layers. You can use Hognestad parabola as your concrete model and trilinear steel model (Parameters of these models should be inputs of the program).

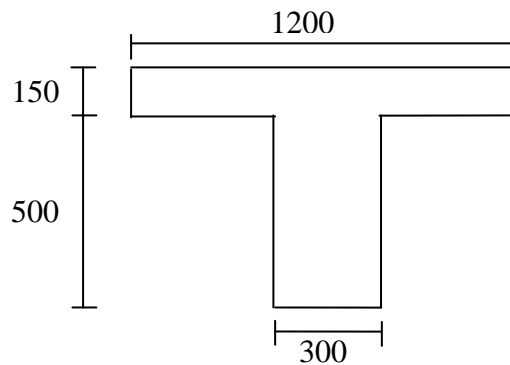
1) Outline the input and output data structure of your program.

2) Verify your program by comparing the response of the beam that we solved in class and homework problem with your program's results. Also check the ultimate capacity by hand calculations and compare. Comment on the number of layers required for your analysis.

For the beam section shown below, conduct the following parametric studies.

Concrete Strength, $f_c$ (MPa)	Tension reinforcement (%)	Compression Reinforcement (%)	Strain at onset of strain hardening
30	0.5	0.25	0.005
40	1.	0.5	0.0075
50	1.5	0.75	0.01

Comment on the effect of these parameters from your results of moment curvature analysis.



All units in mm.

$f_y = 420$  MPa

$f_u = 600$  MPa