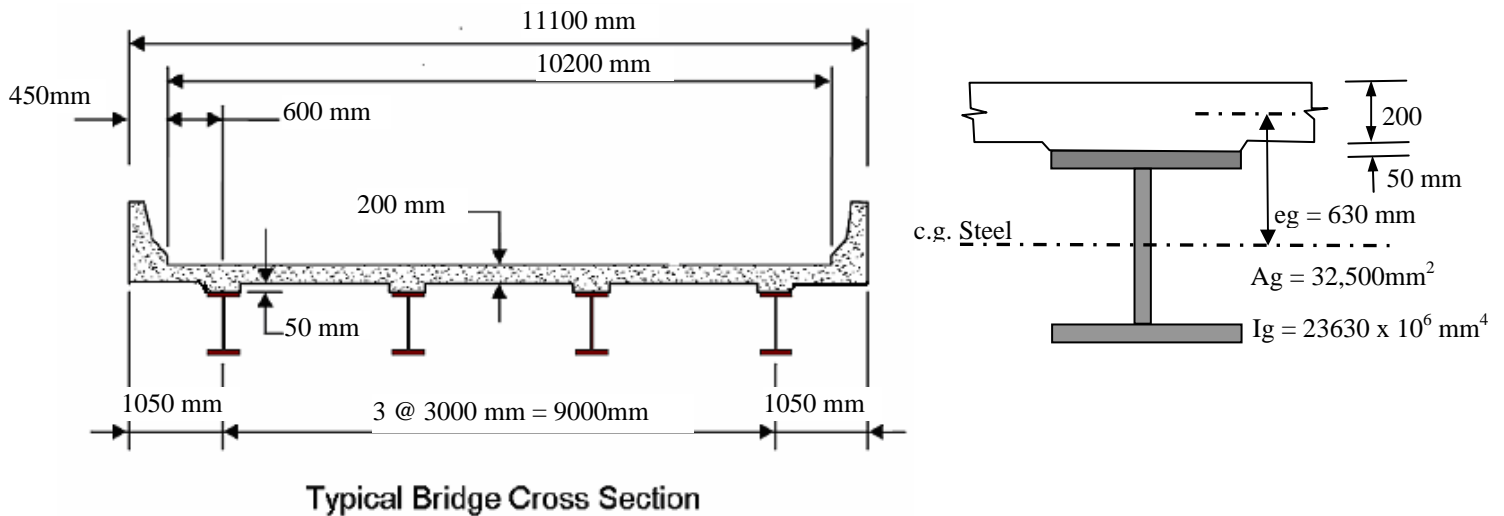


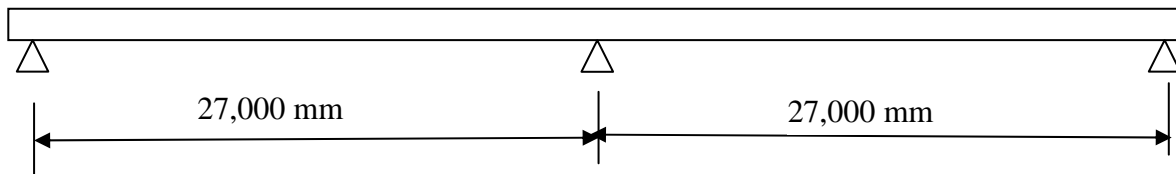
Introduction to Bridge Engineering CE-5145

Mid Term Exam – Take Home Exam

Due Date June 20, 2009 – No Exceptions
No Collective Effort Allowed



Typical Bridge Cross Section



Problem

Bridge Elevation

Max Marks (100)

The elevation and cross-section of a two span continuous bridge are shown above.

1. Carry out Transverse Analysis of the Bridge Deck and estimate max positive and negative bending moments due to the AASHTO HL-93 Design Truck. Show the assumed wheel load positions with neat sketches. Investigate the case of one lane loaded, two lanes loaded and wheel on the overhang portion. (25 marks)
2. Carry out a longitudinal analysis of the bridge to determine the envelope of maximum bending moments and shears for the AASHTO HL-93 Design Truck. Plot the envelopes of maximum positive moments and maximum negative moments. Also plot the envelopes for maximum shear in the bridge. (25 marks)
3. Carry out calculations to determine the maximum positive and negative bending moments in the Exterior Girder and Interior Girder for the case of One Design Lane Loaded and Two Design lanes Loaded. Use AASTO Coefficients Method. (25 marks)
4. Carry out Calculations to determine the maximum shears in Exterior Girder and the Interior Girder for the case of One Design Lane Loaded and Two Design lanes Loaded. (25 marks)

Given Data:

X-Sectional area of Steel Girder = $A_g = 32,500 \text{ mm}^2$

Steel Girder Inertia = $I_g = 23630 \times 10^6 \text{ mm}^4$

Girder Eccentricity from deck slab center = $eg = 630 \text{ mm}$

Modular Ratio $n = 8$

Note: Use of SAP 2000 and Influence lines is allowed to determine the maximum moment and shear force envelopes