CE 621 **PLASTIC ANALYSIS** Spring 2009

Homework #8

Assigned on Wednesday, Mar 25; due on Friday, Apr 03

A braced frame lateral load resisting system has two continuous columns with fixed bases and pin-connected beams and braces, as shown in **Figure 1**. Using static nonlinear pushover analysis (with DRAIN-2DX) up to a global (roof) drift ratio of 3%, find out the failure sequence of axially loaded members/formation of plastic hinges in flexural members. Also find the yield and the ultimate base shear. Plot the base shear vs. global drift diagram.

Assume rigid floor diaphragm effect at each floor. The floor masses and member dimensions are given below. Assume steel I-beam type P-M interaction diagram for beam-column members. Adopt lateral load distribution as per IS 1893 (Part I) - 2002.

Take,
$\{m_4\ m_3\ m_2\ m_1\}$ = {1350 1250 1250 1250} kg-mass
A = 600 cm^2, Z = 23000 cm^3, & I = 950000 cm^4 for columns
A = 150 cm^2, Z = 4500 cm^3, & I = 180000 cm^4 for beams
$\{A_4\ A_3\ A_2\ A_1\}$ = {150 200 225 235} cm^2 for braces
σ_y = 250 MPa for all members
Floor height = bay width = 4 m.

Repeat the same analysis by applying the following P-Δ loads on the floor levels and plot the base shear vs. global drift diagram (upto a global drift of 3%)in the same plot.
$\{P_4\ P_3\ P_2\ P_1\}$ = {5400 5000 5000 5000} kg

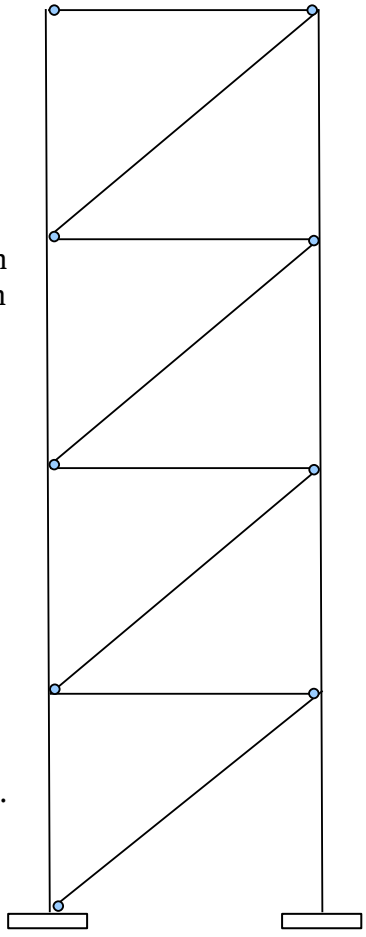

Figure 1. Pin-connected braced frame.