CODE

6.6.3.2.2 It shall be permitted to calculate immediate lateral deflections using a moment of inertia of 1.4 times $\boldsymbol{I}$ defined in 6.6.3.1, or using a more detailed analysis, but the value shall not exceed $\boldsymbol{I_g}$.

6.6.4 *Slenderness effects, moment magnification method*

6.6.4.1 Unless 6.2.5.1 is satisfied, columns and stories in structures shall be designated as being nonsway or sway. Analysis of columns in nonsway frames or stories shall be in accordance with 6.6.4.5. Analysis of columns in sway frames or stories shall be in accordance with 6.6.4.6.

6.6.4.2 The cross-sectional dimensions of each member used in an analysis shall be within 10 percent of the specified member dimensions in construction documents or the analysis shall be repeated. If the stiffnesses of Table 6.6.3.1.1(b) are used in an analysis, the assumed member reinforcement ratio shall also be within 10 percent of the specified member reinforcement in construction documents.

6.6.4.3 It shall be permitted to analyze columns and stories in structures as nonsway frames if (a) or (b) is satisfied:

COMMENTARY

R6.6.3.2.2 Analyses of deflections, vibrations, and building periods are needed at various service (unfactored) load levels (Grossman 1987, 1990) to determine the performance of the structure in service. The moments of inertia of the structural members in the service load analyses should be representative of the degree of cracking at the various service load levels investigated. Unless a more accurate estimate of the degree of cracking at service load level is available, it is satisfactory to use 1.0/0.70 = 1.4 times the moments of inertia provided in 6.6.3.1, not to exceed $\boldsymbol{I_g}$, for service load analyses. Serviceability considerations for vibrations are discussed in R24.1.

R6.6.4 *Slenderness effects, moment magnification method*

R6.6.4.1 This section describes an approximate design procedure that uses the moment magnifier concept to account for slenderness effects. Moments calculated using a first-order frame analysis are multiplied by a moment magnifier that is a function of the factored axial load $\boldsymbol{P_u}$ and the critical buckling load $\boldsymbol{P_c}$ for the column. For the sway case, the moment magnifier is a function of the sum of $\boldsymbol{P_u}$ of the story and the sum of $\boldsymbol{P_c}$ of the sway-resisting columns in the story considered. Nonsway and sway frames are treated separately. A first-order frame analysis is an elastic analysis that excludes the internal force effects resulting from deflections.

The moment magnifier design method requires the designer to distinguish between nonsway frames, which are designed according to 6.6.4.5, and sway frames, which are designed according to 6.6.4.6. Frequently this can be done by comparing the total lateral stiffness of the columns in a story to that of the bracing elements. A compression member, such as a column, wall, or brace, may be assumed nonsway if it is located in a story in which the bracing elements (structural walls, shear trusses, or other types of lateral bracing) have such substantial lateral stiffness to resist the lateral deflections of the story that any resulting lateral deflection is not large enough to affect the column strength substantially. If not readily apparent without calculations, 6.6.4.3 provides two possible ways of determining if sway can be neglected.

R6.6.4.3 In 6.6.4.3(a), a story in a frame is classified as nonsway if the increase in the lateral load moments resulting from $\boldsymbol{P}\Delta$ effects does not exceed 5 percent of the first-order moments (MacGregor and Hage 1977). Section 6.6.4.3(b) provides an alternative method of determining if a frame is