(Hamburger and McCormick 1994). The response involves dynamic amplification of ground motion by response of vertical system and further dynamic amplification from flexible diaphragms. The design forces for seismic design category D and higher have been developed over the years in response to studies of specific failures. It is generally accepted that the rigid diaphragm value is reasonable for structures subjected to high ground motions. For a simple idealization of the dynamic response, these values imply that the combined effects of inelastic action in the main framing system supporting the wall, the wall (acting out of plane), and the anchor itself correspond to a reduction factor of 4.5 from elastic response to an MCE motion and therefore the R value associated with nonlinear action in the wall or the anchor itself is 3.0. Such reduction is generally not achievable in the anchorage itself, thus it must come from yielding elsewhere in the structure, for example, the vertical elements of the seismic force resisting system (SFRS), the diaphragm, or walls acting out of plane. The minimum forces are based upon the concept that less yielding will occur with smaller ground motions and less yielding will be achievable for systems with smaller R factors, which are permitted in Seismic Design Categories B and C. The minimum R factor in Seismic Design Category D is 3.25, excepting cantilever column systems and light-frame walls sheathed with materials other than wood structural panels, whereas the minimum R factors for Categories B and C are 1.5 and 2.0, respectively.

Where the roof framing is not perpendicular to anchored walls, provision needs to be made to transfer both the tension and sliding components of the anchorage force into the roof diaphragm. Where a wall cantilevers above its highest attachment to, or near, a higher level of the structure, the reduction factor based upon height within the structure, $(1 + 2z/h)/3$, may result in a lower anchorage force than appropriate. In such an instance, using a value of 1.0 for the reduction factor may be more appropriate.

REFERENCES

Chopra, A. K. (2007). *Structural Dynamics*, Prentice Hall, Upper Saddle River, NJ

Hamburger, R. O., and McCormick, D. L. (2004). "Implications of the January 17, 1994, Northridge Earthquake on Tilt-Up and Masonry Buildings with Wood Roofs," *Proceedings, 63rd Annual Convention,* Structural Engineers Association of California, Lake Tahoe, Calif., 243–255.

Lopez, O. A., and Cruz, M. (1996). "Number of Modes for the Seismic Design of Buildings," *Earthquake Engrg. and Struct, Dyn.*, 25(8), 837–856.