short-period buildings may be subjected to very high ductility demands, which can be reduced by adopting higher seismic coefficients. Such high ductility demands may have contributed to the damage during the Tokachi-oki earthquake.

Significantly increased loadings are specified by this standard for structures required to dissipate seismic energy in a manner other than by ductile flexural yielding. In addition, the general recommendations made in the previous code for soil types have been formulated into specific requirements.

This standard introduces the concept of a multi-term evaluation of the horizontal seismic design coefficient to be applied to various structures. One of these terms relates to the importance of structures and to the degree to which structures are required to be functional following earthquakes. The need for such a requirement has been clearly demonstrated in recent overseas earthquakes, and similar provisions exist or are proposed in the codes of several countries. Comment on the other terms is given in the standard. The committee believes that at this stage of development in earthquake engineering there is a lack of adequate data that would allow complete separation of all the factors influencing the appropriate level of the design coefficient, and therefore such effects as damping, dynamic amplification, and dutcility are incorporated in the given terms.

An important new provision is the requirement that buildings designed for flexural ductile yielding or for yielding in diagonal braces are to be the subject of capacity design. This requirement includes consideration of the concurrence of earthquake components at right angles to one another, and hence the effect of beam hinges forming simultaneously in all beams framing into a column for a number of adjacent storeys. Although the levels of seismic coefficient for regular buildings have not in general been altered, these levels are considered satisfactory only where the relevant design standards provide an acceptable degree of ductility.

Designers should recognize that the precise properties of construction materials and of structural elements made from them are not clearly known. Furthermore, the interaction of these elements in a building frame under load is extremely uncertain, so that the total design technique is one of some degree of imprecision. In fact, the design result depends so much on the nature of the mathematical model of the building as envisaged by the designer that the use of more advanced techniques of earthquake analysis can easily lose validity.

Dynamic analysis may provide useful information on performance of buildings both in the elastic and inelastic range. To apply these methods, design earthquakes must be chosen and assumptions must be made about damping and inelastic behaviour. However, to avoid large differences in strengths of structures which may result from varying assumptions, it has been considered necessary to relate the requirements found from dynamic analysis to those of the equivalent static force analysis. An important change for spectral modal analysis is that a design spectrum is prescribed which is scaled from the spectrum for the equivalent static force method so that no direct assumptions need to be made for damping and inelastic behaviour.

The principle of multi-term evaluation has also been applied to parts and portions of buildings. This has resulted in design coefficients which may vary from the 1965 provisions. It is believed that these reflect more closely the actual response and result in better performance.

The committee considers that the 1965 provisions concerning "non-structural" damage are inadequate and could result in structural damage and loss of life. Non-structural damage typically represents the greatest monetary loss in an earthquake. There is considerable evidence that modern buildings have low damping and sustain large amplification even in small-to-moderate earthquakes. The separation and interstorey deflection provisions of this standard recognize this.

Further information on the approach adopted in the drafting of the earthquake provisions is given in the March 1976 issue of the Bulletin of the New Zealand National Society for Earthquake Engineering (Vol. 9, No. 1).

Wind loads

Wind loading is now treated in more detail because changes in building design and construction have, for some types of buildings, increased the influence of wind loading in relation to other imposed loads.

An important change is the adoption of gust loadings as the basis for design, in place