SECTION 2 VERIFICATION

2.1 GENERAL REQUIREMENTS

2.1.1 General

All structures shall comply with the requirements for the ultimate limit state and the serviceability limit state as set out in Clauses 2.3 and 2.4 and the appropriate material Standard.

2.1.2 Structural systems

All structures shall be configured with a clearly defined load path, or paths, to transfer the earthquake actions (both horizontal and vertical) generated in an earthquake together with gravity loads to the supporting foundation soil. All elements shall be capable of performing their required function while sustaining the deformation of the structure resulting from the application of the earthquake actions determined for each limit state.

2.1.3 Localized actions

Structural elements and members shall be tied together to enable the structure to act as a whole in resisting seismic actions. Consideration shall be given to actions induced in individual elements due to the displaced shape and the gravity loads.

2.1.4 Earthquake limit state design performance requirements

The design performance requirements are as follows:

(a) Ultimate limit state for earthquake loading shall provide for:

(i) Avoidance of collapse of the structural system; and

(ii) Avoidance of collapse or loss of support to parts of categories P.1, P.2, P.3 and P.4 (Section 8); and

(iii) Avoidance of damage to non-structural systems necessary for emergency building evacuation, that renders them inoperative.

(b) Serviceability limit states for earthquake loading are to avoid damage to:

(i) The structure and the non-structural components that would prevent the structure from being used as originally intended without repair after the SLS1 earthquake as defined in Clause 2.4; and

(ii) In a structure with a critical post earthquake designation (i.e. importance level 4) all elements required to maintain those operations for which the structure is designated as critical, are to be maintained in an operational state or are to be returned to a fully operational state within an acceptable short timeframe (usually minutes to hours rather than days) after the SLS2 earthquake as defined in Clause 2.4.

2.2 STRUCTURAL TYPES

2.2.1 Ductile structures

A ductile structure is one where the structural ductility factor is greater than 1.25 but does not exceed 6.0.

2.2.2 Structures of limited ductility

Structures of limited ductility are a subset of ductile structures. A structure of limited ductility is one where the structural ductility factor is greater than 1.25 but less than 3.0.

SECTION 3 SITE HAZARD SPECTRA

3.1 ELASTIC SITE SPECTRA FOR HORIZONTAL LOADING

3.1.1 Elastic site spectra

The elastic site hazard spectrum for horizontal loading, $C(T)$, for a given return period shall be as given by Equation 3.1(1):

$$C(T) = C_h(T)\, Z\, R\, N(T,D) \quad \ldots 3.1(1)$$

where

$C_h(T)$ = the spectral shape factor determined from Clause 3.1.2

Z = the hazard factor determined from Clause 3.1.4

R = the return period factor R_s or R_u for the appropriate limit state determined from Clause 3.1.5 but limited such that ZR_u does not exceed 0.7

$N(T,D)$ = the near-fault factor determined from Clause 3.1.6

3.1.2 Spectral shape factor, $C_h(T)$

The spectral shape factor, $C_h(T)$, shall be selected from Table 3.1, for the site subsoil class defined in Clause 3.1.3. The spectral shape factor functions are graphed in Figure 3.1 for general cases and in Figure 3.2 for values for the modal response spectrum and the numerical integration time history methods, to determine the $C(T)$ values required for vertical loading, and to determine the $C_h(0)$ values required to evaluate $C(0)$ for parts in Clause 8.2.