Part II—Building

CHAPTER 5

STABILITY

SECTION 501
STRUCTURAL FORCES

501.1 Objective. To provide a desired level of structural performance when structures are subjected to the loads that are expected during construction or alteration and throughout their intended lives.

501.2 Functional statements.

501.2.1 Life safety and injury prevention. Structures shall be designed and constructed to prevent injury to occupants due to loading of a structural element or system consistent with the design performance level determined in Chapter 3.

501.2.2 Property and amenity protection. Structures shall be designed and constructed to prevent loss of property and amenity consistent with the design performance level determined in Chapter 3.

501.3 Performance requirements.

501.3.1 Stability. Structures, or portions thereof, shall remain stable and not collapse during construction or alteration and throughout their lives.

501.3.2 Disproportionate failure. Structures shall be designed to sustain local damage, and the structural system as a whole shall remain stable and not be damaged to an extent disproportionate to the original local damage.

501.3.3 Loss of amenity. Structures, or portions thereof, shall have a low probability of causing damage or loss of amenity through excessive deformation, vibration or degradation during construction or alteration and throughout their lives.

501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account all expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads
2. Live loads
3. Impact loads
4. Explosion loads
5. Soil and hydrostatic pressure loads
6. Flood loads (mean return period)
   Small: 100 years
   Medium: 500 years
   Large: Determined on a site-specific basis
   Very Large: Determined on a site-specific basis
7. Wind loads (mean return period)
   Small: 50 years
   Medium: 75 years
   Large: 100 years
   Very Large: 125 years
8. Wind-borne debris loads
9. Snow loads (mean return period)
   Small: 25 years
   Medium: 30 years
   Large: 50 years
   Very Large: 100 years
10. Rain loads. See Table 501.3.4
11. Earthquake loads (mean return period)
    Small: 25 years
    Medium: 72 years
    Large: 475 years, but need not to exceed $^2/_3$ of the intensity of Very Large loads
    Very Large: 2,475 years. At sites where the 2,475 year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, Very Large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.
12. Ice loads, atmospheric icing (mean return period)
    Small: 25 years
    Medium: 50 years
    Large: 100 years
    Very Large: 200 years
13. Hail loads
14. Thermal loads

501.3.5 Safety factors. The design of buildings and structures shall consider appropriate factors of safety to provide adequate performance from:

1. Effects of uncertainties resulting from construction activities.
2. Variation in the properties of materials and the characteristics of the site.
3. Accuracy limitations inherent in the methods used to predict the stability of the building.
4. Self-straining forces arising from differential settlements of foundations and from restrained dimensional changes due to temperature, moisture, shrinkage, creep and similar effects.

501.3.6 Demolition and alteration. The demolition or alteration of buildings and structures shall be carried out in a way that avoids the likelihood of premature collapse.

501.3.7 Site work. Site work, where necessary, shall be carried out to provide stability for construction on the site and avoid the likelihood of damage to adjacent property.

TABLE 501.3.4
RAIN LOADS

MAGNITUDE OF EVENT	DRAINAGE SYSTEM	MRI (YEARS)	STORM DURATION (MIN.)
Small	Primary	25	60
Small	Secondary	25	15
Medium	Primary	50	60
Medium	Secondary	50	15
Large	Primary	100	60
Large	Secondary	100	15
Very Large	Primary	100	30
Very Large	Secondary	100	10