

# CHAPTER 16

## STRUCTURAL DESIGN

### User notes:

**About this chapter:** Chapter 16 establishes minimum design requirements so that the structural components of buildings are proportioned to resist the loads that are likely to be encountered. In addition, this chapter assigns buildings and structures to risk categories that are indicative of their intended use. The loads specified herein along with the required load combinations have been established through research and service performance of buildings and structures. The application of these loads and adherence to the serviceability criteria enhances the protection of life and property.

**Code development reminder:** Code change proposals to this chapter will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.

### SECTION 1601 GENERAL

**1601.1 Scope.** The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof regulated by this code.

### SECTION 1602 NOTATIONS

**1602.1 Notations.** The following notations are used in this chapter:

- $D$  = Dead load.
- $D_i$  = Weight of ice in accordance with Chapter 10 of ASCE 7.
- $E$  = Combined effect of horizontal and vertical earthquake induced forces as defined in Section 2.3.6 of ASCE 7.
- $F$  = Load due to fluids with well-defined pressures and maximum heights.
- $F_a$  = Flood load in accordance with Chapter 5 of ASCE 7.
- $H$  = Load due to lateral earth pressures, ground water pressure or pressure of bulk materials.
- $L$  = Roof live load greater than 20 psf (0.96 kN/m<sup>2</sup>) and floor live load.
- $L_r$  = Roof live load of 20 psf (0.96 kN/m<sup>2</sup>) or less.
- $R$  = Rain load.
- $S$  = Snow load.
- $T$  = Cumulative effects of self-straining load forces and effects.
- $V_{asd}$  = Allowable stress design wind speed, miles per hour (mph) (km/hr) where applicable.
- $V$  = Basic design wind speeds, miles per hour (mph) (km/hr) determined from Figures 1609.3(1) through 1609.3(8) or ASCE 7.
- $W$  = Load due to wind pressure.
- $W_i$  = Wind-on-ice in accordance with Chapter 10 of ASCE 7.

### SECTION 1603 CONSTRUCTION DOCUMENTS

**1603.1 General.** Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the construction documents.

**Exception:** Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof dead and live loads.
2. Ground snow load,  $P_g$ .
3. Basic design wind speed,  $V$ , miles per hour (mph) (km/hr) and allowable stress design wind speed,  $V_{asd}$ , as determined in accordance with Section 1609.3.1 and wind exposure.
4. Seismic design category and site class.
5. Flood design data, if located in flood hazard areas established in Section 1612.3.
6. Design load-bearing values of soils.
7. Rain load data.

**1603.1.1 Floor live load.** The uniformly distributed, concentrated and impact floor live load used in the design shall be indicated for floor areas. Use of live load reduction in accordance with Section 1607.11 shall be indicated for each type of live load used in the design.

**1603.1.2 Roof live load.** The roof live load used in the design shall be indicated for roof areas (Section 1607.13).

**1603.1.3 Roof snow load data.** The ground snow load,  $P_g$ , shall be indicated. In areas where the ground snow load,  $P_g$ , exceeds 10 pounds per square foot (psf) (0.479 kN/m<sup>2</sup>), the following additional information shall also be provided, regardless of whether snow loads govern the design of the roof:

1. Flat-roof snow load,  $P_f$ .
2. Snow exposure factor,  $C_e$ .
3. Snow load importance factor,  $I_s$ .