CHAPTER

5

GENERAL BUILDING HEIGHTS AND AREAS

Chapter 5 provides general provisions that are applicable to all buildings. These include requirements for allowable floor area, including permitted increases for open spaces and for the use of automatic sprinkler systems; unlimited-area buildings; and allowable height of buildings with acceptable increases. Buildings containing multiple uses and occupancies are regulated through the provisions for incidental uses, accessory occupancies, nonseparated occupancies, and separated occupancies. Miscellaneous topics addressed in Chapter 5 include premises identification and mezzanines.

In addition to the general provisions set forth in Chapter 5, there are several special conditions under which the specific requirements of Chapter 5 can be modified or exempted, including the horizontal building separation allowance and unique provisions for buildings containing a parking garage.

Section 501 *General*

501.2 Address identification. In this section, the *International Building Code*® (IBC®) intends that buildings be provided with plainly visible and legible address numbers posted on the building or in such a place on the property that the building may be identified by emergency services such as fire, medical, and police. The primary concern is that responding emergency forces may locate the building without going through a lengthy search procedure. In furthering the concept, the code intends that the approved street numbers be placed in a location readily visible from the street or roadway fronting the property if a sign on the building would not be visible from the street. Address numbers may be required in multiple locations to help eliminate any confusion or delay in identifying the location of the emergency. The fire code official can require, and must approve, additional address identification locations. Regardless of the sign's location, the minimum height of letters or numbers used in the address is to be at least 4 inches (102 mm) and contrast to background itself. Additional criteria are provided to provide consistency and clarity of the identifying numbers.

Section 503 *General Building Height and Area Limitations*

The IBC regulates the size of buildings in order to limit to a reasonable level the magnitude of a fire that potentially may develop. The size of a building is controlled by its floor area and height, and both are limited by the IBC. Whereas floor-area limitations are concerned primarily with property damage, life safety is enhanced as well by the fact that in the larger building there are typically more people at risk during a fire. Height restrictions are imposed to also address egress concerns and fire department access limitations.

The essential ingredients in the determination of allowable areas are:

1. The amount of combustibles attributable to the use that determines the potential fire severity.
2. The amount of combustibles in the construction of the building, which contributes to the potential fire severity.

In addition to the two factors just itemized, there may be other features of the building that have an effect on area limitations. These include the presence of built-in fire protection (an

automatic fire-sprinkler system), which tends to prevent the spread of fire, and open space (frontage) adjoining a sizable portion of the building's perimeter, which decreases exposure from adjoining properties and provides better fire department access.

A desirable goal of floor-area limitations in a building code is to provide a relatively uniform level of hazard for all occupancies and types of construction. A glance through Table 503 of the IBC will reveal that, in general, the higher hazard occupancies have lower permissible areas for equivalent types of construction and, in addition, the less fire-resistant and more combustible types of construction have more restrictive area limitations.

The IBC also limits the maximum height and number of stories based on similar reasons discussed for area limitations. In addition, the higher the building becomes, the more difficult access for firefighting becomes. Furthermore, the time required for the evacuation of the occupants increases; therefore, the fire resistance of the building should also be increased.

The code presumes that when the height of the highest floor used for human occupancy exceeds 75 feet (22,860 mm), the life-safety hazard becomes even greater because most fire departments are unable to adequately fight a fire above this elevation from the outside. Furthermore, the evacuation of occupants from the building is often not feasible. Thus, Section 403 prescribes special provisions for these high-rise buildings. Similar concerns for buildings with occupied floors well below the level of exit discharge are addressed in Section 405 for underground buildings.

Coming back to this section, the code specifies in Section 504 both the maximum allowable height in feet (mm) and the maximum number of stories. The maximum allowable height in feet is regulated by Table 504.3 primarily by the building's construction type, with limited regard for the occupancy or multiple occupancies located in the building. However, the maximum allowable height in stories can vary significantly based on the occupancy group involved as set forth in Table 504.4. Where multiple occupancies are located in the same building, and the provisions of Section 508.4 for separated occupancies are utilized, each individual occupancy can be located no higher than set forth in the table. See Figure 503-1. Where the nonseparated-occupancies provisions of Section 508.3 are applied, the most restrictive height limitations of

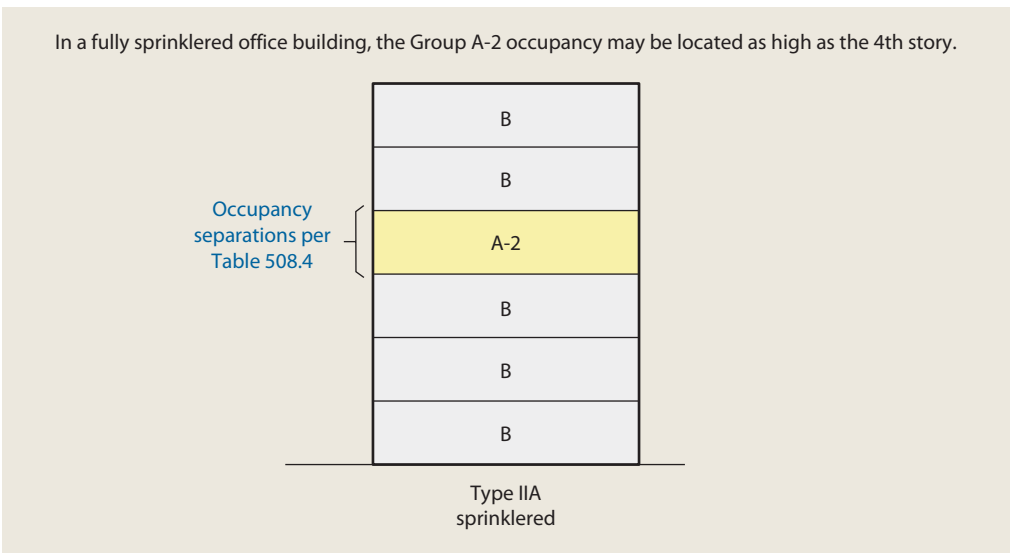

Figure 503-1 **Height limitations—separated occupancies.**

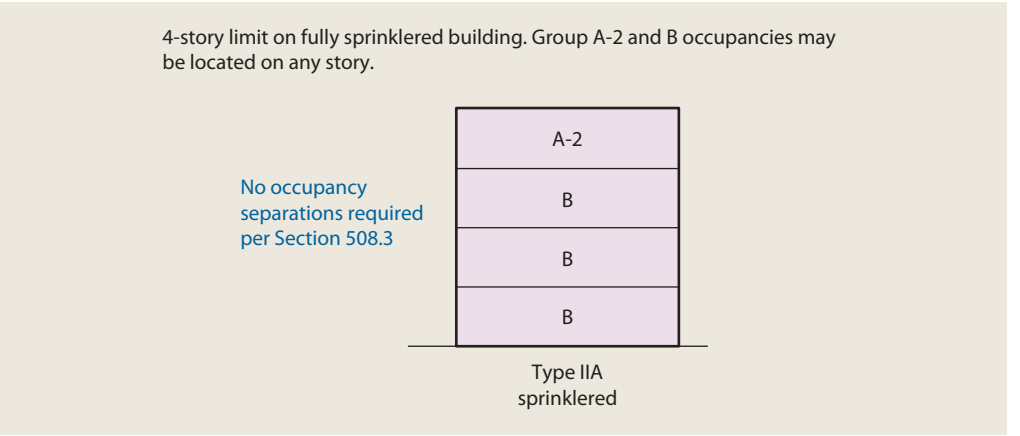

Figure 503-2 **Height limitations—nonseparated occupancies.**

the nonseparated occupancies involved will limit the number of stories in the entire building. See Figure 503-2. In general, the greater the potential fire- and life-safety hazard, the lower the permitted overall height in feet (mm), as well as the fewer the number of permitted stories.

503.1 General. Once the occupancy group(s) and type of construction have been determined, the limitations in Tables 504.3, 504.4, and 506.2 must be consulted individually. Allowable building height, as set forth in Table 504.3, is based on height in feet above grade plane. Both "building height" and "grade plane" are defined in Chapter 2 to ensure consistent application of the provisions. The table includes the increased height allowances that are available for most types of sprinklered buildings. The allowable number of stories is addressed in Table 504.4, presented in a format generally consistent with that used for Tables 504.3 and 506.2. Again, definitions are very important, and in this case the term "story above grade plane" must be fully understood to apply the provisions appropriately. An increase in allowable stories for most types of sprinklered buildings is also applied within Table 504.4.

The determination of maximum allowable building area is initiated in Table 506.2 through the identification of the appropriate allowable area factor. The factor varies based upon occupancy classification, construction type, installation of an automatic sprinkler system, and number of stories in the building, and is applied on a per story basis. Unlike the determination of building height and number of stories, the limitation in the table can be further increased due to the presence of adequate frontage at the building's perimeter. A more detailed analysis can be found in the discussion of Sections 504 and 506.

In this section, the IBC also indicates that fire walls, in addition to exterior walls, create separate buildings when evaluating for allowable height and area. Defined and regulated under the provisions of Section 706, the function of a fire wall is to separate one area of a building from another with a fire-resistance-rated vertical separation element. Where a fully complying fire wall is provided, it provides two compartments, one on each side of the wall, which may each be considered under the IBC to be separate buildings. Multiple fire walls may be utilized to create a number of separate buildings within a single structure. One of the resulting benefits of the use of a fire wall is that the limitations on height, number of stories, and area are then addressed individually for each separate building created by fire walls within the structure, rather than for the structure as a whole.

503.1.1 Special industrial occupancies. This special provision exempts certain types of buildings from both the height limitations and the area limitations found in Sections 504

and 506. Thus, the type of construction is not limited, regardless of building height or area. It is also not necessary to comply with the provisions of Section 507 for unlimited-area buildings to utilize this provision. Applicable to structures housing low-hazard and moderate-hazard industrial processes that often require quite large areas and heights, the relaxation of the general provisions recognizes the limited fire severity, as well as the need for expansive buildings to house operations such as rolling mills, structural metal-fabrication shops, foundries, and power distribution. It is not the intent that buildings classified as Group H occupancies be addressed under the allowances of Section 503.1.1.

503.1.2 Buildings on the same lot. Where two or more buildings are located on the same lot, they may be regulated as separate buildings in a manner consistent with buildings situated on separate parcels of land.

As an option, multiple buildings on a single site may be considered one building, provided the limitations of height, number of stories, and floor area based on Sections 504 and 506 are met. The height and number of stories of each building and the aggregate area of all buildings are to be considered in the determination. Under this method, the provisions of the code applicable to the aggregate building shall also apply to each building individually. Further regulations for buildings on the same lot are discussed in the commentary for Section 705.3.

Section 504 *Building Height and Number of Stories*

Because automatic fire-sprinkler systems have exhibited an excellent record of in-place fire suppression over the years, Tables 504.3. and 504.4 allow height increases where an automatic fire-sprinkler system is installed throughout the building. The tables typically reflect an increase of one story in the number of stories, and 20 feet (6,096 mm) in building height, where the building is provided with an automatic fire-sprinkler system throughout.

There are basically four variations to the general requirements for height and story increases:

1. Extended height and number of stories allowances are not permitted for Group I-2 occupancies of Type IIB, III, IV, or V construction, or for Groups H-1, H-2, H-3, and H-5 occupancies of any construction type. These occupancies present unusual hazards that limit their heights even where a sprinkler system is present.
2. One-story aircraft manufacturing buildings and hangars may be of unlimited height when sprinklered and surrounded by adequate open space. Such uses require very large structures and through the safeguards provided, should be adequately protected.
3. For Group R buildings provided with an NFPA 13R sprinkler system, the tables reflect that the increases in height and number of stories apply only up to a maximum of 60 feet (18,288 mm) and four stories, respectively. The limitation of four stories and 60 feet for buildings sprinklered with a 13R system cannot be exceeded under any circumstances. In those residential buildings where an NFPA 13, rather than an NFPA 13R system, is installed, the limitations of 60 feet (18,288 mm) and four stories are not applicable.
4. Roof structures such as towers and steeples may be of unlimited height when constructed of noncombustible materials, whereas combustible roof structures are limited in height to 20 feet (6,096 mm) above that permitted by Table 504.3. In all cases, such roof structures are to be constructed of materials based on the building's type of construction. These requirements are not based on the presence of the sprinkler system. Additional requirements for roof structures can be found in Section 1510.

Section 505 *Mezzanines and Equipment Platforms*

A mezzanine is defined in Chapter 2 as an intermediate floor level within a room or space. As long as the area of the mezzanine is limited in size, an intermediate floor without enclosure causes no significant safety hazard. The occupants of the mezzanine by means of sight, smell, or hearing will be able to determine if there is some emergency or fire that takes place either on the mezzanine or in the room in which the mezzanine is located. However, once portions of or all of the mezzanine is enclosed, or the mezzanine exceeds one-third the area of the room in which it is located, life-safety problems such as occupants not being aware of an emergency or finding a safe exit route from the mezzanine become important. Therefore, the code places the restrictions encompassed in this section on mezzanines to ameliorate the life safety that can be created.

505.2 Mezzanines. By virtue of the conditions placed on mezzanines in Section 505, a complying mezzanine is not considered to create additional building area or an additional story for the purpose of limiting building size. The floor area of a complying mezzanine need not be added to the area of the floor below for the purpose of limiting building area by Section 506. This allowance essentially provides for free floor area in the comparison of the total actual area to the total allowable area. As previously mentioned, complying mezzanines also do not contribute to the actual number of stories in relationship to the allowable number of stories permitted by Table 504.4. The limitations imposed on mezzanines are deemed sufficient to permit such benefits.

In contrast to the above allowances, the floor area of mezzanines must be included as a part of the aggregate floor area in determining the fire area. Because the size of a fire area is based on a perceived level of fire loading present within the building, the contribution of a mezzanine's fire load to the fire loading in the room in which the mezzanine is located cannot be overlooked. Figure 505-1 depicts the proper use of these provisions. The clear height above and below the floor of the mezzanine is also regulated at a minimum height of 7 feet (2,134 mm).

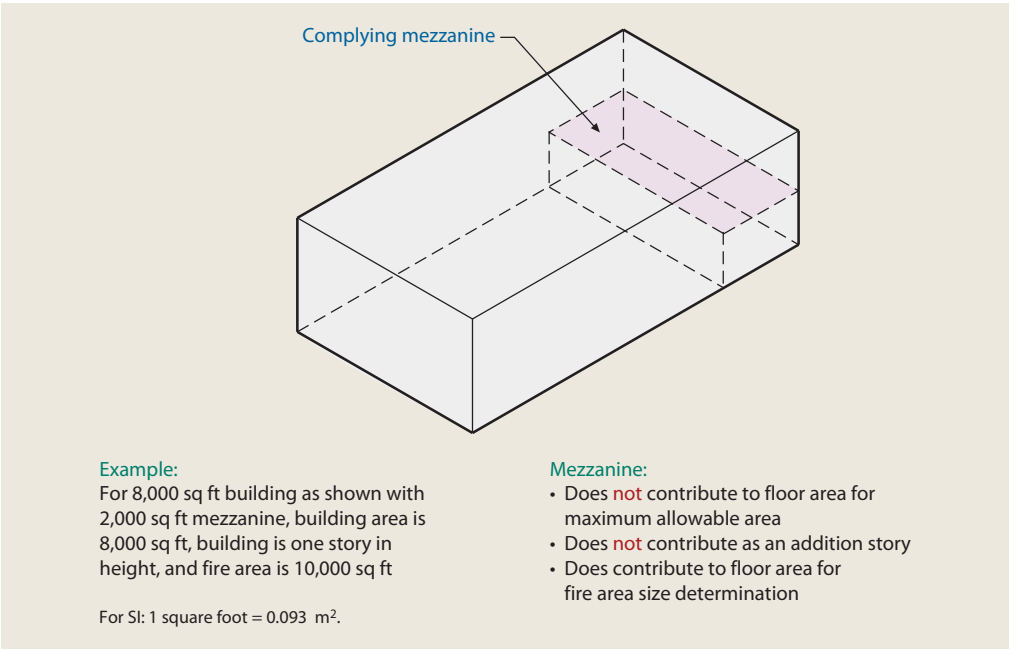

Figure 505-1 **Mezzanine height and area.**

505.2.1 Area limitation. There is no limit on the number of mezzanines that may be placed within a room; however, the total floor area of all mezzanines must typically not exceed one-third the floor area of the room in which they are located. See Figure 505-2. As illustrated in Figure 505-3, any enclosed areas of the room in which the mezzanine is located are not to be utilized in the calculations for determining compliance with the one-third rule.

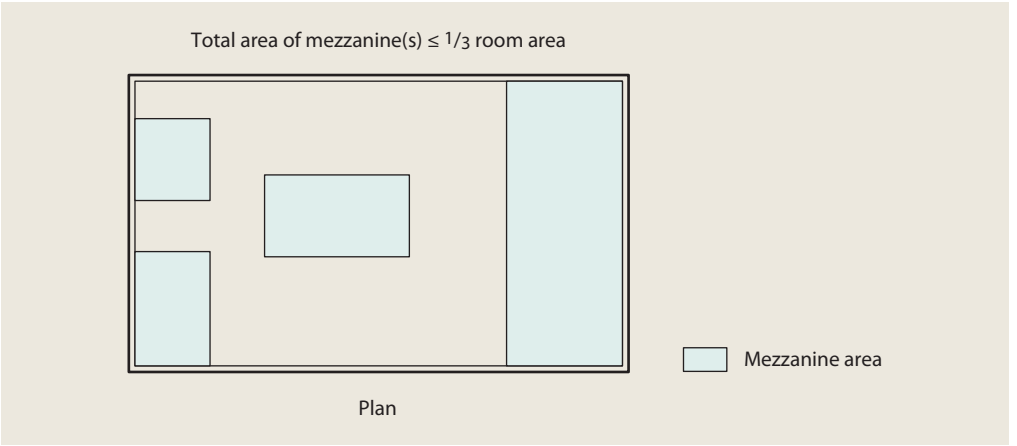

Figure 505-2 **Mezzanine area.**

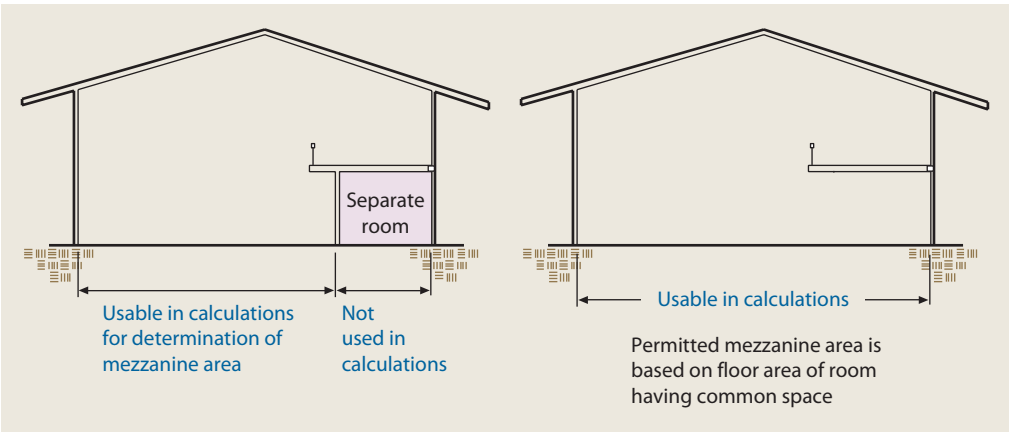

Figure 505-3 **Mezzanine area.**

Where two specific conditions exist, the aggregate floor area of mezzanines may be increased up to two-thirds of the floor area of the room below. First, the building must contain special industrial processes as identified in Section 503.1.1, and second, the building shall be of Type I or Type II construction. Intermediate floor levels are very common in buildings of this kind because of the nature of their operations. By limiting the increased mezzanine size to noncombustible buildings housing primarily noncombustible processes, fire safety is not compromised.