

Figure 407-3 Group I-2 domestic cooking facilities.

Corridor doors protecting those spaces adjacent to the corridor are not required to have a fire-protection rating, nor are they required to be self-closing assemblies. They must, however, be able to limit the transfer of smoke through the opening but need not be tested for air leakage under UL 1784. One of the most controversial issues relative to the arrangement of health-care facilities such as hospitals and nursing homes is the matter of the installation of door closers on doors to patient sleeping rooms. The health-care industry has long believed it is more important to the proper delivery of health-care services that the doors to patient rooms not be self-closing and therefore constantly closed. In recognition of this special need, self-closing or automatic-closing devices are not required on corridor doors. Positive latching is required, however, and roller latches are not considered acceptable latching hardware. Where positive latching is not desired, typically where sliding doors are installed at patient or treatment rooms, the common corridor arrangement cannot be utilized. In such instances, the spaces could be designed as care suites under the provisions of Section 407.4.4. Corridor-type configurations within such suites are not subject to the requirements of Section 407.3.

Locking devices may be arranged so that they are readily operable from the patient-room side and are readily operable by the facility staff from the opposite side. This special arrangement permits keys or other limited access methods to be utilized for the care recipient rooms. However, egress from the care recipient rooms shall be unrestricted unless such rooms are in mental-health facilities or regulated as controlled egress doors per Section 1010.2.14.



Figure 506-6 Yards and public ways available for area increases.

30 feet (9,144 mm). Where a lesser amount of the perimeter has adequate open area, or where some portions of the complying open space are less than 30 feet (9,144 mm) in width, or both, the area increase for frontage will be reduced as illustrated in Application Examples 506-5 and 506-6.

Whereas 75 percent is generally the largest allowable frontage increase, a greater area increase is permitted for those buildings that comply with all of the requirements for unlimitedarea buildings as described in Section 507, other than compliance with the 60-foot (18,288-mm) open space or public way requirement. Where such a condition exists, Table 506.3.3.1 is to be applied.

A maximum frontage increase of 150 percent can be achieved based on at least 75 percent of the perimeter being open with a minimum width of 55 feet (16,764 mm). Once 60 feet (18,288 mm) of accessible open space and public ways is obtained for 100 percent of the building's perimeter, the provisions of Section 507 are applicable and Table 506.3.3.1 need not be used. An example of the increased frontage increase is shown in Application Example 506-7

It is necessary to make two assumptions when applying Table 506.3.3.1. The frontage increase (If) should be based on the smallest public way or open space that is 30 feet (9,144 mm) or more in width. In addition, where the smallest public way or open space of more than 30 feet (9,144 mm) in width is also 60 feet (18,288 mm) or more in width, the column identified as "55 to less than 60" feet of open space should be applied.

Must all qualifying open space be considered? When applying Table 506.3.3, it may be advantageous for the designer to not consider portions of the open space that are 20 feet (6,096 mm) or more in width. By electing not to take credit for a qualifying yard, there are situations where the frontage increase (If) will be greater than if all yards with a width of at least 20 feet (6,096 mm) are considered. It is acceptable to ignore any open space where its inclusion in the application of Tables 506.3.3 will result in a smaller frontage increase.

system is required where the occupant load exceeds 100 for Group A-2 occupancies, or 300 for all other Group A occupancies. The sprinkler protection shall extend to, and include, the level of exit discharge. Whether building occupants are located on an upper story or on the roof, they are exposed to a similar hazard as they travel down through the building to the discharge level. It should be noted that this provision does not require the roof to be sprinklered or provided with any alternative fire-extinguishing system.

The application of this provision should not be extended to other requirements of the code. For example, the occupied roof is not considered as *building area*, *fire area*, or a *story*. Therefore, even though an occupied roof is viewed as being an assembly occupancy, the limitations for allowable area and many other code provisions would not apply. Note that the height limits as regulated by Section 504 for allowable number of stories are regulated in a special manner as described in the discussion of Section 503.1.4.

903.2.1.7 Multiple fire areas. The option of compartmentalizing Group A occupancies into separate fire areas simply to avoid any sprinkler requirement is limited in its application. Where the fire areas share a common egress system and the combined occupant load of the Group A fire areas exceeds an occupant load of 299, sprinkler protection is required in accordance with Section 903.2.1.

Figure 903-5 depicts a condition where a sprinkler system is required even though multiple complying fire areas have been provided. An occupant load of 400 must be assigned to the corridor based upon the full contributing occupant loads of the Group A occupancies. Note that



Figure 903-5 Multiple Group A fire areas example.

Handrails may be omitted under four conditions. Where a single change in elevation occurs at a deck, patio, or walkway, handrails are not required, provided a complying landing area is present. In Group R-3 occupancies, handrails are not required at a single riser serving an entrance door or egress door. In individual dwelling units and sleeping units of Group R-2 and R-3 occupancies, it is also permissible to provide a change in room elevation of three or fewer risers and not install a handrail. The last exemption is a unique situation where a platform lift is serving as the landing and some type of handhold or gripping surface is provided, such as a wall around the platform lift.

1011.12 Stairway to roof. To provide for easy access to roof surfaces and to facilitate fire fighting in buildings four or more stories in height, at least one stairway is required to extend to the roof unless the roof is considered unoccupied. However, even where the roof is considered unoccupied, access by way of a stairway must be provided where the roof and penthouse contain elevator equipment that must be accessed for maintenance. Where a stairway is not required, access may be achieved through the use of an alternating tread device, a ships ladder, or a permanent ladder. Access is not a requirement on steeper roofs where the slope exceeds 4 units vertical in 12 units horizontal (33-percent slope).

1011.13 Guards. Roof hatches are permitted as a means of access to unoccupied roofs where such access is required in buildings four or more stories in height. In addition, roof-hatch openings are often provided in low-rise buildings for varied purposes, including access to roof-top equipment. This provision addresses the hazard created where the roof hatch is located very close to the roof edge. See Figure 1011-11. It is necessary that persons accessing the roof by a roof hatch be protected from falling off the roof as a result of a trip or misstep. Occasionally, these roof accesses are used during inclement weather, emergency situations, or times of darkness. It is during these conditions when the hazard level is even higher.



Figure 1011-11 Protection at roof-hatch openings.

1011.14 Alternating tread devices. An alternating tread device is a unique type of stairway that also has some characteristics of a ladder. Because it is considered difficult to use for egress purposes, an alternating tread device may only be used as a means of egress in a limited number of occupancies. In factories, warehouses, and high-hazard occupancies, this device

Those special types of elements or structures that are not conveniently addressed in other portions of the *International Building Code*[®] (IBC[®]) are found in this chapter. By special construction, the code is referring to pedestrian walkways, tunnels, awnings, canopies, marquees, solar energy systems, and similar building features that are unregulated elsewhere. Unique types of structures are also addressed, including relocatable buildings, membrane structures, temporary structures, shipping container structures, and greenhouses.

Section 3102 Membrane Structures

3102.1 General. Because membrane structures have several unique characteristics that set them apart from other buildings, they are regulated in Chapter 31 under the provisions for special construction. The regulations cover all such structures, including air-supported, air-inflated, cable-supported, frame-supported, and tensile membrane structures. The intent of the provisions is that, except for the unique features of membrane structures, they otherwise comply with the code as far as occupancy requirements, allowable area, and other regulations are concerned. Membrane structures are typically limited to one story in height insofar as there is insufficient experience to justify multilevel structures enclosed with a membrane. There is an allowance for use in multistory buildings where the membrane structure is of noncombustible construction and serves as the building's roof.

The membrane structures regulated by the IBC are deemed to be permanent in nature, erected for a period of at least 180 days. Membrane structures in place for shorter periods of time, such as temporary tents, are to be regulated by the *International Fire Code*[®] (IFC[®]). Where a membrane structure is erected as a part of a permanent structure, such as a covering for a building, balcony, or deck, it must comply with the provisions of Section 3102 for any time period.

Because of the limited hazards present in structures not used for human occupancy, such as water-storage facilities, water clarifiers, sewage-treatment plants, and greenhouses, only a few provisions are applicable where membrane structures cover these types of facilities. Limitations on the membrane and interior liner material, as well as the structural design, are the only criteria in the IBC that apply to membrane structures covering facilities not typically used for human occupancy.

3102.3 Type of construction. In general, membrane structures are considered to be of Type V construction, except where the membrane structure is shown to be noncombustible. In this case, the membrane structure should be classified as Type IIB construction. Membrane structures supported by heavy-timber framing members are to be considered Type IV-HT construction. The code permits the use of nonflame-resistant plastic material for the membrane of a greenhouse structure that is not available to the general public.

3102.6 Mixed construction. This section permits the use of a noncombustible membrane on a structure that would otherwise comply as Type IA, IB, or IIA where the membrane is used exclusively as a roof or skylight and is located at least 20 feet (6,096 mm) above any floor, balcony, or gallery. This exception is similar to Footnote b of Table 601. This exception will permit nonrated noncombustible membranes to be constructed as roof systems for sports stadiums and similar buildings as well as for atriums. In other types of construction under the same conditions, the membrane need only be flame resistant.

3102.8 Inflation systems. Where membrane structures are air-supported or air-inflated, this section addresses the regulations for equipment, standby power, and support. The primary

inflation system shall consist of one or more blowers, designed in such a manner that over pressurization is prevented. Air-supported or air-inflated structures exceeding 1,500 square feet (140 m²) in floor area must also be provided with an ancillary inflation system. This backup system, connected to an approved standby power-generating system, shall operate automatically to maintain the inflation of the structure if the primary system fails.

Additional support for the membrane must also be provided where covering structures that have occupant loads of at least 50 and in those cases where covering swimming pools.

Section 3103 Temporary Buildings

Special requirements that are applicable to temporary structures are set forth in Section 3103. For the purpose of applying the applicable code provisions, "temporary" is considered as being erected for a time period of less than 180 days. The IFC contains a significant number of provisions applicable to such structures. In addition, the IBC identifies some key criteria that must be applied to temporary structures, including conformity with the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements. Permits are typically required, as are construction documents. The scope of Section 3103 includes special event structures (see Figure 3103-1), tents, umbrella structures, and other membrane structures.



Figure 3103-1 Special event structures at music festival.

When proposing to install a relocatable building for the first time, or moving a relocatable building to a new site, a permit must be obtained from the building official. When doing so the applicant is required to submit an application in accordance with Section 105, provide construction documents per Section 107, and provide additional information as outlined in Section 3113.2. Key elements of this supplemental information include the original design drawings and applicable structural design loads considered in the design. In addition, Section 3113.3 requires that the manufacturer's data plate be attached on, or near, the electrical panel and that the information on this data plate coincides with the information submitted in the permit application.

Section 3115 Intermodal Shipping Containers

The re-use of intermodal shipping containers as buildings or structures has become quite common. Section 3115 addresses the minimum safety requirements that should be considered in relation to these containers without duplicating existing code provisions. This section clarifies additional dimensional and structural requirements that need to be included with the construction documents. In addition, it requires that a third-party inspection be performed of the container prior to re-purposing it. This third-party inspection will verify that a data plate is attached to the container and that all appropriate information is known prior to retrofitting the container for use within a building or structure. Several other requirements are outlined, including specific structural requirements for shipping containers that conform to ISO 1496-1.

KEY POINTS

- Membrane structures include those buildings that are air-supported, air-inflated, cable- or frame-supported, and tensile-supported.
- Noncombustible membrane structures are classified as Type IIB construction, whereas combustible membrane structures are considered Type VB.
- Air-supported or air-inflated membrane structures are regulated for equipment, standby power, and support.
- Complying pedestrian walkways and tunnels are not considered to contribute to the floor area or height of the connected buildings.
- Marquees are to be of noncombustible construction and have dimensional and location limitations.
- Relocatable buildings are required to comply with Section 3113 as well as IEBC Chapter 14.
- Intermodal shipping containers used for, or within, buildings and structures require special documentation in addition to a third-party inspection confirming the data plate information prior to re-use.