

THE CODE CORNER

Building Classification – Part 1: Occupancies

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In life, most everything is given some type classification whether it's objective, such as drivers' licenses, or subjective, such as social status. Then there're those people who're in "a class all by themselves." Buildings, like much of everything else, are classified, as well.

There are two essential elements of classification in the building code: occupancy and construction type. In this article (Part 1) I'll address the essential elements of determining a building's classification based on its occupancy. My next article (Part 2) will focus on classifying a building based on the type of construction used.

In both the *Uniform Building Code* (UBC) and the *International Building Code* (IBC), Chapter 3 establishes the requirements for classifying buildings based on occupancy. It is interesting that the UBC specifically defines what an "occupancy" is, but the IBC doesn't. So, I'll use the UBC's definition, which "is the purpose for that a building, or part thereof, is used or intended to be used." I didn't say it was a good definition. Essentially, an occupancy establishes how the building will be used, whether for business, residential, or one of the many other types we'll cover.

One of the fallacies I have found in the UBC is that it placed the responsibility for classifying a building's occupancy directly on the building official (Section 301). The reason I think this was inappropriate is based on the timing of the classification. How many architects took their projects to their building official during the early design stage to have it "classified"? Not many, if any at all. It's important to classify a building's occupancy early in the design phase because so much of the remaining building code provisions are dependent on the occupancy classification.

The IBC, on the other hand, took a more logical approach by stating all "...structures shall be classified with respect to occupancy..." Period. There's no assignment of responsibility included. Therefore, the architect can "legally" determine a building's occupancy; and the building official, in accordance with his Section 104 duties, will either concur or not concur with the architect's decision during plan review as a part of enforcing the provisions of the code. Even so, knowledge of occupancy classifications by the architect can prove to be a cost savings feature early in project development.

The IBC has established 10 occupancy groups, with some having multiple subgroups. These subgroups are numbered with a purpose. The lower the number, the greater the perceived risk is for the occupants. For example, A-1 has large occupant loads in fixed seating. Whereas A-5 includes seating of large numbers of people for viewing outdoor activities. Assuming the occupancies had equal occupant loads, the A-1 is indoors with fixed seats that reduce egress speed. The A-5 occupancy, although having fixed seats, is outdoors reducing the risk of smoke and heat build up within the seating area. The 10 occupancy groups and their respective subgroups are listed below:

- Assembly: Groups A-1, A-2, A-3, A-4 and A-5
- Business: Group B
- Educational: Group E
- Factory and Industrial: Groups F-1 and F-2
- High Hazard: Groups H-1, H-2, H-3, H-4 and H-5
- Institutional: Groups I-1, I-2, I-3 and I-4
- Mercantile: Group M
- Residential: Groups R-1, R-2, R-3 and R-4
- Storage: Groups S-1 and S-2
- Utility and Miscellaneous: Group U

Most of the occupancies are assigned strictly on the buildings intended use, or uses. I say "uses," since most buildings have many spaces that can be classified under more than one occupancy group. For example, a fire station may have sleeping quarters for the firemen (Residential Group R), office areas (Business Group B), vehicle and

other miscellaneous storage areas for the fire equipment (Storage Group S), and a training area (Assembly Group A). Buildings that can be classified with multiple uses are considered “mixed occupancies.”

However, before calling a building a mixed occupancy, you need to first determine if the additional occupancies can be considered “incidental use areas.” These are spaces that provide minor support to the building’s main occupancy. IBC Section 302.1.1 provides the criteria for incidental use areas, which typically include storage, mechanical, and other specialty spaces. If a space qualifies as an incidental use area (See Table 302.1.1), it will be classified as a part of the main occupancy it’s incidental to. For example, if an office building (Group B) has a 200 square foot storage area (Group S) within the office area, then it could be considered Group B if it is separated from the office area by 1-hour fire barrier, or is provided an automatic fire-extinguishing system for the storage space only in accordance with Table 302.1.1.

As stated above, most spaces can be classified solely on their intended use; however, some occupancy assignments are more objective. For example, a room may be used for assembly purposes, but if the space is equal to or less than 750 square feet, then its classification is considered a part of the main occupancy. Using the fire station example above, if the training area is 750 square feet in area, then it will be considered a part of the Business Group. Any larger, then it would have an Assembly Group classification.

Why the 750 square foot limitation, you ask? Well, it goes back to the basic definition of an “Assembly” occupancy. If the occupant load is 50 or greater, and is used for the gathering of people for various purposes (such as civic, social, or religious), then it’s considered an Assembly occupancy. If you take 750 square feet and divide that by 50 occupants, you get 15 square feet per occupant, which equals the most liberal occupant load factor for an assembly use.

Another occupancy group that relies on objective criteria is the High-Hazard Group H. Group H occupancies are assigned based on maximum quantities of materials that pose a physical or health hazard. These materials may be used for manufacturing or processing, stored in the building, or generated as a product or byproduct through a process. Upon first glance, determining which H occupancy group is appropriate may seem to require a chemical engineering degree. However, with material safety data sheets (MSDS) and the quantities involved at hand, you could probably figure it out. If it’s still too much for you, I suggest discussing the project with your fire plans examiner at the building department for guidance.

Institutional (Group I) occupancies include buildings with occupants that are under supervised care, live in a controlled environment where they’re limited physically by either age or health, or they have personal liberties restricted by detention for penal or correctional purposes. Group I-3, which includes prisons, jails and correctional facilities, is further subdivided into “conditions.” However, unlike the occupancy subgroups, the 5 conditions are numbered with increasing risk to the higher numbers.

Residential (Group R) occupancies apply to buildings that are used for sleeping purposes, among the many other uses associated with residential uses. R-1 and R-2 groups apply to buildings that house occupants in large numbers. R-1 includes transient type housing consisting of hotels and motels, while R-2 housing is more of a permanent nature, such as apartments and dormitories. Groups R-3 and R-4 are required to comply with the requirements of the *International Residential Code* (IRC). R-3 occupancies include single detached houses and duplexes, and R-4 occupancies include assisted living and residential care facilities that have more than 5, but less than 16, occupants, including staff.

Returning to mixed occupancies, designers of buildings that involve multiple occupancies within the same structure have the option of selecting one of two types of mixed occupancies: Separated or nonseparated uses. Under the UBC, mixed occupancies could only be considered as “separated” because occupancy separation walls of varying fire-resistance ratings were required between certain occupancies. The IBC has the same provisions, except fire barriers are used in lieu of occupancy separation walls. But, the IBC also permits mixed occupancies to be nonseparated, without any fire barriers. However, as I’m sure you’ve suspected, there’s a catch...the height and area requirements for each occupancy used are to be applied to the entire building, and the most restrictive construction type will be applied to the entire building. To illustrate this application, let’s use the fire station as an example (assuming no increases for yards or fire sprinkler):

<u>Space</u>	<u>Actual Area</u>
<u>First Floor</u>	
Office Area (B)	3,600 sf
<u>Apparatus Bays (S-2)</u>	<u>8,400 sf</u>
Total	12,000 sf
<u>Second Floor</u>	
Sleeping Area (R-2)	1,800 sf
Day Room (A-3)	1,000 sf
<u>Training Room (A-3)</u>	<u>800 sf</u>
Total	3,600 sf

Since the IBC establishes allowable area by floor, rather than total building area used by the UBC, the first floor of the fire station will set the minimum floor area for the building. The table below compares each occupancy group's allowable area to the actual area, as well as the allowable number of floors to actual. Since this is a 2-story building, all construction types limited to 1 story are not allowed. As the table below shows, the Group A-3 occupancy is the most restrictive with either Type IIIA or Type IV construction. The Type IV construction, which is restricted to heavy timber construction, may be unsuitable for this building's use, so the IIIA would probably be the most appropriate.

Occupancy	Highest Floor Located	Allowable Area (Table 503)	Allowable Stories (Table 503)	Minimum Construction Type
A-3	2	14,000 sf	3	IIIA
		15,000 sf	3	IV
B	1	18,000 sf	3	VA
R-2	2	12,000 sf	3	VA
S-2	1	13,500 sf	2	VB

The allowable areas and building heights may be increased through consideration of automatic fire sprinkler protection and wide yards around the building, but that's a discussion for another time. Additionally, construction types, which I've introduced above, are also of significant importance in properly applying the building code since they establish minimums based on building materials. And, like area increases, construction types will also be a subject of my next article.

The establishment of occupancy types is based on years of research and experience, and it is one of the essential building blocks in developing an effective building code. Architects and engineers should have a good understanding of what constitutes each occupancy group and how these occupancy groups can affect the design of a building. Occupancy groups are just one piece of evidence that not all buildings are created equal.

To comment on this article, suggest other topics, or submit a question regarding codes, contact the author at ron@specsandcodes.com.

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