# Chicago Building Code Modernization

## Implications for Tenant Remodels in High-Rise Buildings

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# Implications for Tenant Remodels in High-Rise Buildings

This paper intends to analyze the application of the new Chicago Building Code (CBC) to a typical tenant remodel of a business occupancy in a high-rise building, highlighting the differences between the existing CBC and the new code. For the purposes of this paper, a remodel of an approximately 40,000 square-foot (3,716 square-meter) floor in a fully-sprinklered office high-rise for a single tenant with no change in occupancy (B-Business) will be analyzed.

To calculate the occupancy per floor, Chicago is retaining the 100 square-foot (9.3 square-meter)-per-person standard for B (Business) occupancy that is in the current code (Div. 3; 13-56-320 and 1004.5). Chicago did not utilize the 150-square-foot (4.6-square-meter)-per-person standard for Business occupancy found in the 2018 version of the IBC. This was done in recognition of the new prevalence of denser business occupancies, such as co-working space. The new code will also adopt the concentrated business use areas (1004.8), which requires the actual occupant load be utilized for specific, more densely-populated business uses, but not to exceed one occupant per 50 square feet (4.6 square meters). The new code also adopts and allows for an increased occupancy load (not exceeding a density of 7 square feet (0.65 square meters) per occupant) in any building per section 1004.5.1; however, the language has been adjusted to require the Alternative Code Approval Process in order to obtain such an increase. For purposes of this example, we will assume this tenant has a denser-than-normal occupancy for business per section 1004.8 and plans to accommodate 500 persons, instead of the 400 that would be the typically calculated at 100 square feet (9.3 square meters) per person.

For calculating egress, the new code is changing from the existing unit of egress method and adopting the IBC method of width factors. In our example analysis, we will assume the high-rise has three stairwells, all 56 inches (1,422 millimeters) wide with 3-foot (914-millimeter) doors at the entrance to each stairwell. Under the current code, the door would be the limiting factor, allowing for 405 occupants. This would not accommodate the 500 occupants the tenant desires. Per the new code calculation, the door would still be the limiting factor, but would allow for 678 occupants. Note that the clear width of the door is the *nominal* width of the leaf in the current code but is the *actual* clear width when the door is opened 90 degrees in the new code (see Figure 1).

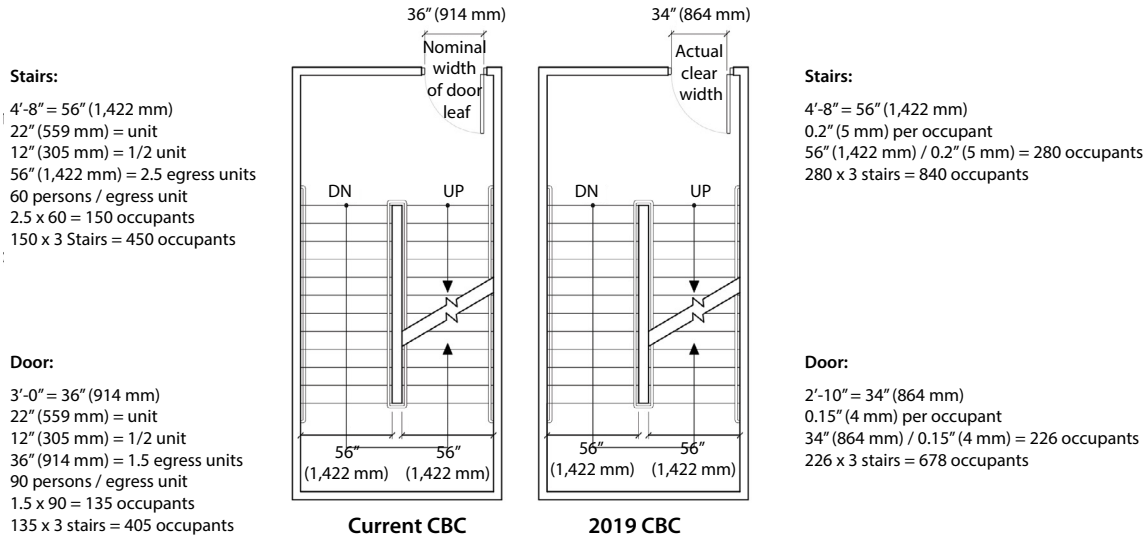
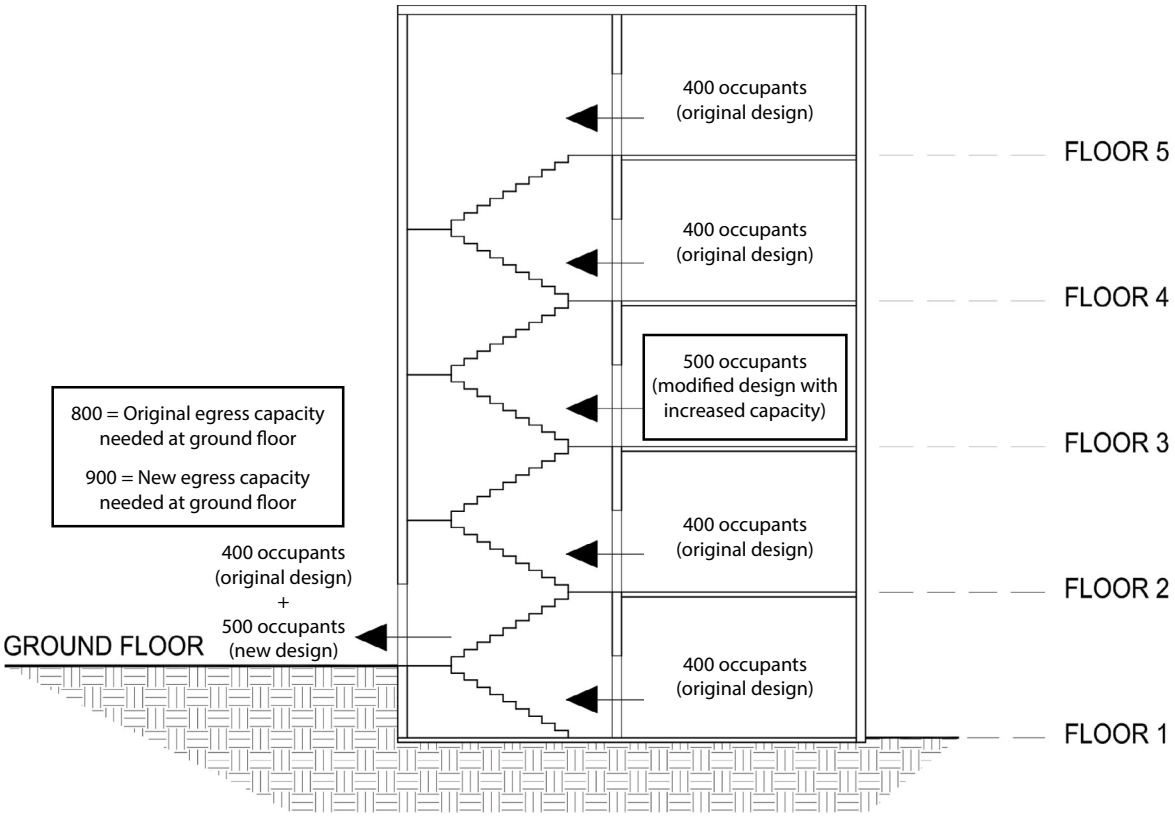



Figure 1. Egress calculations for stairs in high-rise buildings will change between the prior and revised CBC codes.

Allowing for increased occupancy can be advantageous. This can benefit current trends in the industry such as co-working spaces or the desire to convert a floor of an office high-rise to an amenity space. Under the current code, amenity spaces prove to be challenging, because the occupant calculation changes from "office" to "assembly", increasing the occupant count to a level typically exceeding the exiting capacity. This in turn requires complicated solutions, involving navigating horizontal exits or negotiating a method of placarding and controlling the population. The new code will allow greater ease in the conversion of office to amenity space.

It is important to note that increased occupancy counts need to be addressed throughout the rest of the applicable codes. Toilet fixture counts would need to be verified or upgraded to account for any increase in occupancy. In our example analysis, the existing 400 persons, calculated using the existing code, would equate to a fixture count of 20 water closets and 10 lavatories. The 500-person count utilizing section 1004.8 of the new code equates to a fixture count of 28 water closets and 26 lavatories.

In addition, whenever occupancy is increased from that originally designed on a floor of a multistory building, overall occupancy should be considered. Assuming all floors in this example were designed for the business occupancy of 100 square feet (9.3 square meters) per person, then each floor would have been calculated at 400 occupants for egress purposes. In a convergence scenario, the egress doors at grade were most likely designed for the convergence of two floors, each designed for 400 occupants per floor. Our example floor is proposing to increase the occupancy to 500. This alters the original analysis, requiring the egress door capacity at grade to be the sum of the converging floor occupancy (400) plus 500. The same factor found in the new code for doors allowing more people to egress from a floor would also be applied to the doors at grade, thus increasing that capacity as well. Whenever an occupancy count is increased above the original design, it warrants a check to ensure that an unsafe condition is not being created (see Figure 2).




(Note: Figure is diagrammatic only and does not represent number of exits required, capacity of exits, etc.)

Figure 2. A change in occupancy allowances will affect egress requirements at both the individual floor and building exit levels.

Increasing the number of occupants may also increase the number of exits required, which could be a limiting factor in existing high-rise buildings, especially those with only two egress stair enclosures. The new code is more lenient than the existing code on the number of exits; however, an increased population could require three exits where only two were previously required. The current code requires two exits for any business-occupancy space exceeding 40 occupants (Div 10; 13-160-050 a). Under the new code, this will increase, requiring two means of egress when the occupancy equals or exceeds 50, or the common path of travel exceeds 115 feet (35 meters) (Table 1006.2.1). Under the new code, three means of egress will be required when the occupant load equals or exceeds 501 (Table 1006.3.2), except that up to 600 occupants are allowed when utilizing a horizontal exit. The new code will retain the ability to egress through a lobby. The terminology for the placement of exits will be modified from being located "remotely" from one another in the current code (Div.10; 13-060-080) to adopting the common terminology of one-half the length of the maximum overall diagonal for a non-sprinklered building, and one-third the length of the maximum overall diagonal for a sprinklered building (1007.1.1)

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Requirements for door swings into exit corridors will be more lenient for business occupancies under the new code as well. The existing code does not allow doors to restrict the required width when open in any position (Div. 10; 13-160-200 c). The new code will allow doors to encroach upon the means of egress, so that it does not reduce the required width by more than one-quarter (1005.7.1). This will allow for slightly more floor area in rooms, especially those containing more than 50 occupants, where the doors are required to swing in the direction of egress, such as break rooms or amenity spaces. Previously, corridors had to be wide enough to accommodate the door swing plus the required egress width, or the doors had to be recessed or pocketed.

Accessibility-related provisions have been modified in this version of the code as well. The new code has been aligned with the provisions of the 2018 Illinois Accessibility Code (IAC). The IAC, the 2010 ADA as well as the 2009 ICC A117.1 (referenced from the new Chicago Building Code) will all apply to a tenant remodel in a high-rise. Accessibility provisions of the new code took effect on 1 December 2019 for all permit applications, regardless of which version of the code is being utilized for the project. The new code has a disclaimer stating that the City of Chicago is not responsible for enforcing any state or federal laws such as the ADA, Fair Housing Act, Environmental Barriers Act, or the Rehabilitation Act, and that any permitted work will be evaluated for compliance with Chicago code, and will not be evaluated for compliance with any such laws (1101.3). Although this is neither new nor a change, it is now clearly spelled out in the code. One area to note, as it relates to the example analysis: the 2018 Illinois Accessibility Code requires horns and strobes in private offices (IAC 215.3 and the IAC definition of Employee Work Area).

Other areas of the new code of note for this example analysis are as follows:

- The minimum ceiling height will be established in the new code at 7 feet, 6 inches (2,286 millimeters) for occupiable spaces and corridors and 7 feet (84 millimeters) for bathrooms, toilet rooms, kitchens and storage

rooms. The means of egress ceiling height will be established in the new code at 7 feet, 6 inches (2,286 millimeters) as well, with a few exceptions (1207.2 & 1003.2).

- The new code requires urinal partition screens for every urinal utilized by employees. Screens are to start at 12 inches (305 millimeters) off the floor and extend to 60 inches (1,524 millimeters) above the finished floor, and are to be 18 inches (457 millimeters) deep or extend 6 inches (152 millimeters) beyond the front lip of the urinal, whichever is greater (1209.3.2).

- The requirement for enclosed elevator lobbies will not be adopted in the new version of the code.

Chicago's Energy Conservation Code (CECC) was adopted on 1 June 2018. The CECC is intended to align with the Illinois-mandated 2018 Illinois Energy Conservation Code. It is important to note that the Illinois amendments are not incorporated into the CECC, so both documents should be reviewed. Two conditions to consider for an office tenant remodel, such as our example analysis: First, if the wattage is over the allowable wattage for light fixtures falling within daylighting zones, the requirement for daylighting controls in open office areas is affected. Second, there are new required locations for occupancy and vacancy sensors.

The new code establishes an interim fire-prevention code until the formal modifications are adopted in phase 3. This interim code allows the fire department to elect or enforce certain provisions of the 2018 IFC before its formal adoption and retains in effect certain chapters and/or sections of the existing fire code.

In conclusion, it appears that Chicago is in a unique position with its existing business-occupancy high-rise buildings. There has been an increasing trend toward smaller workspaces and larger amenity floors or spaces, both of which require a higher occupancy density on a floor than the typical business density of 100 square feet (9.3 square meters) per person. Typically, a higher density can only be accommodated by adding egress capacity in the form of additional stairs, increasing the size of existing stairs, or incorporating a horizontal exit. Modifying stairs in a high-rise is a very unlikely condition, and horizontal exits can be complicated and disruptive to an open-floor-plan concept. The increased capacity that is introduced by the change in the number of exit units in the previous code, to factors in the new code, allow for higher-density-occupancy tenant remodels, without the significant modification to egress components that high-rises in other cities may have to address. Chicago's adoption of International Building Code concepts has made the city uniquely situated to accommodate workspace density trends.

# About the Author

**Lori Chandler, AIA**
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Having joined Epstein in 2006, Lori Chandler has led many multi-disciplinary project teams as Senior Project Architect. In her current position as Senior Technical Architect, Associate Vice President, Chandler is the head of the Quality Review Team, providing project reviews for technical accuracy, code compliance, coordination, and constructability, as well as tracking job progress and maintaining informative dialogue with owner's representatives and clients. Chandler's technical ability resulted in her direct participation in the Chicago Code Modernization Process.

Chandler has overseen a wide variety of complex industrial manufacturing, retail, commercial and distribution-center projects. Her work experience also includes large, complex projects, including convention and exhibition centers, airport renovations, casinos, hotels, and the renovation and rehabilitation of hospitals.

# About the CTBUH

The Council on Tall Buildings and Urban Habitat (CTBUH) is the world's leading resource for professionals focused on the inception, design, construction, and operation of tall buildings and future cities. Founded in 1969 and headquartered at Chicago's historic Monroe Building, the CTBUH is a not-for-profit organization with an Asia Headquarters office at Tongji University, Shanghai; a Research Office at Iuav University, Venice, Italy; and an Academic Office at the Illinois Institute of Technology, Chicago. CTBUH facilitates the exchange of the latest knowledge available on tall buildings around the world through publications, research, events, working groups, web resources, and its extensive network of international representatives. The Council's research department is spearheading the investigation of the next generation of tall buildings by aiding original research on sustainability and key development issues. The Council's free database on tall buildings, The Skyscraper Center, is updated daily with detailed information, images, data, and news. The CTBUH also developed the international standards for measuring tall building height and is recognized as the arbiter for bestowing such designations as "The World's Tallest Building."

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