

RECREATION CENTERS AND BUILDING CODES - THEN AND NOW

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“If a builder has built a house for a man, and has not keyed his work, and the wall has fallen, that builder shall make that wall firm at his own expense.”

Hammurabi Code #233, translated by C. H. W. Johns in 1904

King Hammurabi of the ancient City of Babylon is believed to have authored the world’s first building codes. Among the 282 laws that Hammurabi proclaimed, six pertained to the design and construction of habitable space. The Codes of Hammurabi were inscribed on stone tablets and publicly displayed. Although many Babylonians were unable to read, illiteracy did not exonerate builders from penalties for mistakes which could include death.

In the 21st Century, building codes are written by regulatory authorities and enforced by local jurisdictions. With the exception of deliberate gross negligence, the penalty for a code violation today is generally a civil lawsuit. In fact, many codes are revised after the successful legal challenge of an ambiguous code. Unlike Hammurabi’s engraved Law of Code, now on display in the Louvre Museum, modern-day building codes are living breathing entities that formalize the lessons learned from lawsuits, tragedies like the collapse of the World Trade Center and new Civil Rights Laws such as the American with Disabilities Act of 1990 (ADA).

Over the past two decades, building codes have undergone multiple revisions, some of which are more relevant to recreation and assembly buildings than other building types. This article touches on three revisions having the greatest impact on Recreation (Type A-3) and Public Assembly (Type A-4) structures:

1. ADA Seating Dispersion
2. Egress Requirements
3. The 20 Foot Rule

ADA Seating Dispersion

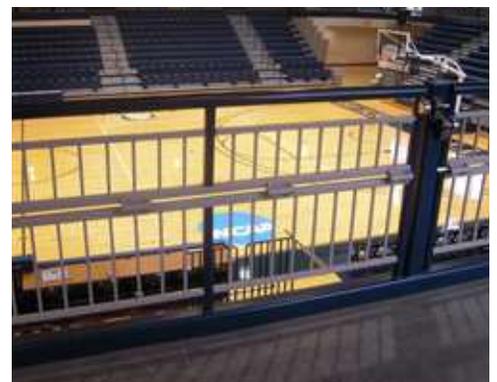
When the ADA was enacted into law, it was impossible for architects, seating manufacturers and facility owners to fully understand the requirements for compliance because the law did not include guidelines for enforcement. Local building authorities were reluctant to enforce or rule on ADA because it was a civil rights statute.

Initially, ADA accessible seating in athletic performance venues was distributed primarily on the floor at court level. One of the first major challenges to this seating distribution came from the Paralyzed Veterans of America (PVA) who filed a lawsuit five years after the passage of ADA. The lawsuit maintained that a wheelchair-bound person could not see over standing spectators. The landmark court decision in favor of the PVA forever changed the design of accessible seating in assembly buildings. Prior to this ruling, the Department of Justice provided no clarification on the distribution requirements for wheelchair locations in assembly buildings.

While Section 4.33.3 of the ADA Accessibility Guidelines (ADAAG) made reference to lines of sight, no specific reference was made to seeing over standing patrons. The courts found that the MCI Center (Verizon Center) in Washington DC was non-compliant in the quantity of wheelchair and companion seats, and in having proper sight lines that enable a wheelchair-bound person to view the play area from behind standing patrons. This case, along with a subsequent related case, set the precedence for the prevailing ADA seating requirements.



Code of Hammurabi



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A guard rail at Berry College is locked in an upright position for safety and folds in half for a wheelchair patron. Seats underneath the rail are lower to prevent obstructed view when standing.

Egress Requirements

Egress requirements for Type A-3 and Type A-4 assembly buildings were unchanged from 1987 to 2009. Both Building Officials Code Administration (BOCA) and International Building Codes (IBC) provided a formula for calculating the number of doors and stairs required to exit the occupancy load from buildings with sprinkling systems. In 2009, the IBC revised the code to require the same number of egress doors and stairs formerly required in non-sprinklered buildings. The new code requires larger stairways and more exit doors for the same number of occupants. Complying with these requirements can be pricey, especially in a facility that contains a recreation court (A-3 Assembly) and a performance court (A-4 Assembly). The Authority Having Jurisdiction (AHJ) may count the occupancy of these spaces simultaneously. By combining the exiting requirements of two large-volume spaces with high occupant loads, the AHJ can force designs that sacrifice valuable program space in exchange for stairwells, elevators and other means of egress. The tables below illustrates the impact of this change for an occupancy load of 1,500 persons.

1987 BOCA & 2006 IBC CODES			
	CORRIDOR	DOORS	STAIRS
REQUIREMENT PER PERSON	.15 inch	.15 inch	.2 inch
X 1,500 PERSONS =	225 inch	225 inch	300 inch
TOTAL REQUIREMENTS	18.75 feet	18.75 feet	25 feet
UNIT REQUIREMENTS	18.75' wide corridors	7 doors @ 36" wide	4 stairs @ 6.25' wide

2009 IBC CODE			
	CORRIDOR	DOORS	STAIRS
REQUIREMENT PER PERSON	.2 inch	.2 inch	.3 inch
X 1,500 PERSONS =	300 inch	300 inch	450 inch
TOTAL REQUIREMENTS	25 feet	25 feet	37.5 feet
UNIT REQUIREMENTS	25' wide corridors	9 doors @ 36" wide	4 stairs @ 9.375' wide or 6 stairs @ 6.25' wide

Occupancy loads are calculated by dividing the space to be occupied by a square foot area per person. For example, the 2009 IBC calculates the occupancy load for a floor area with moveable chairs at seven square feet per occupant. The calculation of occupancy load is impacted by whether patrons are standing or seated, and in what type of chair they are seated.

The 20 Foot Rule

For 25 years, the prevailing interpretation made by design professionals and building officials was that building fire protection codes excluded roof structural members and decking 20 feet or more above any floor. This interpretation allowed designers to create open and light roof structures in field houses, recreation courts, performance courts and natatoriums. In addition, building officials would normally grant a variance to allow the exposed structure of a jogging track suspended above the gymnasium floor. Even though the track surface was considered a floor, the track was constructed with non-combustible materials; it was sprinkled on the underside; it contained no concealed spaces and it was highly visible. Local officials would normally grant a variance to allow the roof structure above the jogging track to remain unprotected for the same reasons that the jogging track variance was allowed.

When the 2009 IBC was published, the wording for fire-resistance rating requirements was changed slightly. Initially the wording did not appear to have substantial impact, but the accompanying commentary addressing the new requirements clarified that the intent of the 20 foot provision applies only to roof construction and secondary members, not to primary members of the structural frame. This means that the main roof trusses, or beams, must now be protected from fire via fireproofing or, if allowed by the AHJ, fire modeling could be presented to prove

that fireproofing is not required. These code revisions that arose from the National Institute of Standards and Technology's (NIST) investigation of the World Trade Center collapse are aimed at increasing the fire resistance of structures, especially taller structures, so they can be more easily evacuated in emergencies. Even though this change occurred in the 2009 IBC, it was not immediately widely enforced due to lack of awareness on the part of code officials. Recent increased enforcement of this fire code revision is having a significant impact on construction cost and aesthetics.

Cost

If the architect and owner want to achieve a light and airy ceiling structure, then the primary structural members have to be coated with an intumescent coating that swells up under heat and protects the steel from damage for an established time period. Prices can vary, but there is an additional cost to the project.

\$5.50/SF

Additional cost for intumescent coating of the primary roof steel of a typical three-court gymnasium

\$97,000

Additional cost for intumescent coating of the primary roof steel for an 18,000 SF three-court gymnasium

If spray-on fire proofing is used, the cost is lower, but the less attractive appearance of fireproofing may trigger other expenses to conceal the visually unappealing material.

Aesthetics

Without adding significant cost to the project, a light, airy and open gymnasium structure is no longer achievable. From the stand point of this article's authors, there does not appear to be a well-defined reason for the definition changes in the 2009 IBC. In some jurisdictions, such as the Governing Building Authority in the State of Virginia (B-Com), the use of fire modeling is allowed. This provision permits a computer simulation of a fire, and its predicted path and reaction to the space. The cost of modeling ranges from \$30,000 to \$70,000 and in most cases modeling shows that fire in a Type A-3 or A-4 space does not heat the steel to a temperature that compromises its strength before the required time period of one hour.

At the date of this publication, the code wording for high ceiling spaces continues to be interpreted differently, therefore it is essential that architects review all interpretations made by the local AHJ.



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Intumescent coating in the Marshall University Recreation Center.

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