~~**410.3.5.3 Smoke test.** Curtain fabrics shall have a smoke-developed rating of 25 or less when tested in accordance with ASTM E 84.~~

~~**410.3.5.4 Tests.** The completed proscenium curtain shall be subjected to operating tests prior to the issuance of a certificate of occupancy.~~

3. Revise standard in Chapter 35 as follows:

NFPA

80~~—99~~ 07 Fire Doors and Other Opening Protectives ~~Fire Windows~~

Reason: The existing criteria are outdated and not thorough. The proposed referenced standard began to incorporate requirements for Fire Safety Curtains in 1998 and in this edition for the first time there is an ANSI standard representing a broad consensus of interest and affected parties. It is much more complete, thorough, and performance based than current or previous standards. Unofficial draft is attached.

Cost Impact: The code change proposal will increase the cost of this component for a significant number of stages because it requires motorizing to increase reliability and permit much greater closing forces to overcome the effects of dirt, rust, and age.

Analysis: The edition of the standard proposed was not available for review at the time the monograph was published.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G88–06/07

410.3.5, 410.3.5.1, 410.3.5.2, 410.3.5.3, 410.3.5.4, Chapter 35

Proponent: Gregory J. Cahanin, Cahanin Fire & Code Consulting, representing himself

1. Revise as follows:

410.3.5 Proscenium curtain. Where a proscenium wall is required to have a fire-resistance rating, the stage opening shall be provided with a fabric fire curtain ~~of approved material~~ installed and tested in accordance with NFPA 80, or an approved water curtain complying with Section 903.3.1.1. ~~The fire curtain shall be designed and installed to intercept hot gases, flames and smoke and to prevent a glow from a severe fire on the stage from showing on the auditorium side for a period of 20 minutes. The closing of the fire curtain from the full open position shall be accomplished in less than 30 seconds, with the last 8 feet (2438 mm) of travel requiring 5 or more seconds for full closure.~~

2. Delete without substitution:

~~**410.3.5.1 Activation.** The curtain shall be activated by rate-of-rise heat detection installed in accordance with Section 907.10 operating at a rate of temperature rise of 15 to 20°F per minute (8 to 11°C per minute), and by an auxiliary manual control.~~

~~**410.3.5.2 Fire test.** A sample curtain with a minimum of two vertical seams shall be subjected to the standard fire test specified in ASTM E 119 for a period of 30 minutes. The curtain shall overlap the furnace edges by an amount that is appropriate to seal the top and sides. The curtain shall have a bottom pocket containing a minimum of 4 pounds per linear foot (5.9 kg/m) of batten. The exposed surface of the curtain shall not glow, and flame or smoke shall not penetrate the curtain during the test period. Unexposed surface temperature and hose stream test requirements are not applicable to the proscenium fire safety curtain test.~~

~~**410.3.5.3 Smoke test.** Curtain fabrics shall have a smoke-developed rating of 25 or less when tested in accordance with ASTM E 84.~~

~~**410.3.5.4 Tests.** The completed proscenium curtain shall be subjected to operating tests prior to the issuance of a certificate of occupancy.~~

3. Revise standard in Chapter 35 as follows:

NFPA

80~~—99~~ 07 Fire Doors and Other Opening Protectives ~~Fire Windows~~

Reason: *NFPA 80, Standard for Fire Doors and Other Opening Protectives, 2007 Edition* has a new chapter covering Fabric Fire Curtains. Removal of design, activation, and test requirements from the IBC will provide more complete prescriptive and performance requirements for fabric fire curtains when NFPA 80 is referenced.

The *UBC 4-1, Proscenium Firesafety Curtains* was last published in 1997. In the last 5 years the NFPA Fire Doors and Windows committee expanded its scope and reformulated its committee to get representation from the theater fire curtain industry and developed a new chapter to address installation, testing, and maintenance of fabric fire curtains. This newly released standard provides the only national consensus standard on theater fire curtains.

The new chapter of NFPA 80 on Fabric Fire Curtains provides more complete design, testing, and installation requirements than the IBC Section 410 requirements now in the code. This new chapter provides updated requirements similar to the UBC 4-1 fire safety requirements that are now out of print. Subject areas include performance, activation, fire test and operating test requirements which are more detailed that the current 4.10.3.5 requirements. NFPA 80 addresses fabric fire safety curtain components, fire safety curtain fabric and testing requirements, labeling of fabric, installation requirements for proscenium openings, rigging and lifting equipment requirements, operation requirements including closing speeds and times, emergency operation requirements, and acceptance testing requirements. NFPA 80 is currently referenced in the IBC for fire doors and fire windows.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: The edition of the standard proposed was not available for review at the time the monograph was published.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G89–06/07

411.7, Chapter 35 (New)

Proponent: Manny Muniz, Manny Muniz Associates, LLC

1. Revise as follows:

411.7 Exit marking. Exit signs shall be installed at the required exit or exit access doorways of amusement buildings. Approved directional exit markings shall also be provided. Where mirrors, mazes or other designs are utilized that disguise the path of egress travel such that they are not apparent, approved <u>and listed</u> low-level exit signs <u>that comply with Section 1011.4,</u> and directional path markings <u>listed in accordance with UL 1994,</u> shall be provided and located not more than 8 inches (203 mm) above the walking surface and on or near the path of egress travel. Such markings shall become visible in an emergency. The directional exit marking shall be activated by the automatic fire detection system and the automatic sprinkler system in accordance with Section 907.2.11.2.

2. Add standard to Chapter 35 as follows:

Underwriters Laboratories

<u>UL 1994-04 Luminous Egress Path Marking Systems, with revisions through February 2005</u>

Reason: To clarify that low-level exit signs and directional path markings shall be listed. Presently, Section 7.10.7.1 requires internally illuminated exit signs be listed. Section 411.7 does not reference this requirement. UL 924, Standard for Safety Emergency Lighting and Power Equipment, has specific electrical and performance test criteria for exit signs in general, and an additional test for impact damage for exit signs installed at floor–level. Without a referenced safety and performance standard, the AHJ must make their own determination as to whether an exit sign is safe to use or that it will perform for 90 minutes in the event of primary power loss.

Likewise, Section 411.7 does not reference a test standard for directional path markings. UL 1994, Standard for Luminous Egress Path Marking Systems, has specific safety and performance test criteria for egress path marking systems. Without a referenced safety and performance standard, the AHJ must make their own determination as to whether a directional path marking system is safe to use or that it will perform for 90 minutes in the event of primary power loss.

The Life Safety Code (NFPA 101), which is used in every state in the US, contains similar requirements in Section 7.10.1.7 and 7.10.7.1 for floor-proximity egress path marking systems and exit signs to be tested and listed. The IBC should not be less stringent.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: Code changes being heard by the MOE Development committee deal with similar issues related the photoluminous egress markings. The standard UL 1994-05 has been reviewed for compliance with ICC Council Policy #28, Section 3.6. In the opinion of ICC Staff, the standard complies with ICC Criteria for referenced standards.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G90–06/07

412 (New); IFC 509.1 (IBC [F] 911.1)

Proponent: Jessica Larson, Hanover County, VA, representing the Hanover County Heartworkers

THIS PROPOSAL IS ON THE AGENDA OF THE IBC GENERAL AND THE IFC CODE DEVELOPMENT COMMITTEES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC

Add new section as follows:

SECTION 412
AUTOMATED EXTERNAL DEFIBRILLATORS

412.1 Scope. The provisions of this section shall apply to buildings and structures, or a portion thereof classified as assembly, educational, institutional, and mercantile.

Exception: Any use or occupancy type as determined by the building official.

412.2 Definition. The following word and term shall, for the purposes of this chapter and as used elsewhere in this code, have the meaning shown herein.

AUTOMATED EXTERNAL DEFIBRILLATOR (AED). A portable electronic device that diagnoses and treats cardiac arrest by detecting any abnormalities and, if necessary, directs the rescuer to deliver an electric shock to the victim. This shock, called defibrillation, may help the heart to reestablish an effective rhythm of its own.

412.3 Location. An AED shall be provided on the premises at an approved location. Each occupancy, as required by this section, shall provide both the building department and fire department/emergency response personnel with a layout showing the location of each AED. An additional copy of the layout shall be maintained in an approved location at the building.

(Renumber subsequent sections)

PART II – IFC

IBC [F] 911.1 (IFC 509.1) Features. Where required by other sections of this code, a fire command center for fire department operations shall be provided. The location and accessibility of the fire command center shall be approved by the fire department. The fire command center shall be separated from the remainder of the building by not less than a 1-hour fire barrier constructed in accordance with Section 706 or horizontal assembly constructed in accordance with Section 711, or both. The room shall be a minimum of 96 square feet (9 m^2) with a minimum dimension of 8 feet (2438 mm). A layout of the fire command center and all features required by the section to be contained therein shall be submitted for approval prior to installation. The fire command center shall comply with NFPA72 and shall contain the following features:

1. The emergency voice/alarm communication system unit.
2. The fire department communications unit.
3. Fire detection and alarm system annunciator unit.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air-handling systems.
6. The fire-fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking stairway doors simultaneously.
8. Sprinkler valve and water-flow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, fire-fighting equipment, ~~and~~ fire department access and automated external defibrillators (AED) locations.
13. Worktable.
14. Generator supervision devices, manual start and transfer features.
15. Public address system, where specifically required by other sections of this code.

Reason: Every year, sudden cardiac arrest claims the lives of over 250,000 Americans before they reach a hospital. Their chance of survival is less than 5%. An AED (automated external defibrillator) can help to increase that chance. Up to 50,000 of these deaths could've been prevented, had an AED been available for use in the emergency. This is a life safety issue. While the intent of the building code is to protect the public health, safety, and general welfare, the implementation of an AED into an organization is also a crucial step toward public health and safety. According to the American Red Cross, the current treatment for sudden cardiac arrest is the cardiac chain of survival, which involves 4 steps: 1) Early access to care 2) Early CPR 3) Early defibrillation 4) Early advanced cardiac life support. By requiring the installation of AED's into an occupancy, we can complete the cardiac chain of survival, and we are also maintaining the building code's intent to "safeguard the public health, safety and general welfare…" (Section 101.3, 2000 IBC).

Cost Impact: The code change proposal will increase the cost of construction.

PART I – IBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IFC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G91–06/07
419

Proponent: Lawrence Brown, CBO, National Association of Home Builders (NAHB)

Delete without substitution:

~~**SECTION 419**~~
~~**GROUP I-1, R-1, R-2, R-3**~~

~~**419.1 General.** Occupancies in Groups I-1, R-1, R-2 and R-3 shall comply with the provisions of this section and other applicable provisions of this code.~~

~~**419.2 Separation walls.**Walls separating dwelling units in the same building and walls separating sleeping units in the same building shall comply with Section 708.~~

~~**419.3 Horizontal separation.** Floor/ceiling assemblies separating dwelling units in the same buildings and floor/ceiling assemblies separating sleeping units in the same building shall be constructed in accordance with Section 711.~~

Reason: There is no reason to duplicate the existing provisions from Section 708 and 711 in another section of the IBC. There is nothing "special" about these provisions that require repetitive text from Chapter 7 to be placed in a chapter on special detailed requirements. As one can clearly ascertain from the text of Sections 708 and 711 (shown below), these provisions already exist in the IBC (underlined). In addition, neither Section contains any provision directly related to Group R-3.

SECTION 708 - FIRE PARTITIONS

708.1 General. The following wall assemblies shall comply with this section:
1. Walls separating dwelling units in the same building.
2. Walls separating sleeping units in occupancies in Group R-1 hotel, R-2 and I-1 occupancies.
3. Walls separating tenant spaces in covered mall buildings as required by Section 402.7.2.
4. Corridor walls as required by Section 1017.1.
5. Elevator lobby separation as required by Section 707.14.1.
6. Residential aircraft hangars.

SECTION 711 - HORIZONTAL ASSEMBLIES
711.1 General. Floor and roof assemblies required to have a fire-resistance rating shall comply with this section.
711.2 Materials. The floor and roof assemblies shall be of materials permitted by the building type of construction.
711.3 Fire-resistance rating. The fire-resistance rating of floor and roof assemblies shall not be less than that required by the building type of construction. Where the floor assembly separates mixed occupancies, the assembly shall have a fire-resistance rating of not less than that required by Section 508.3.2 based on the occupancies being separated. Where the floor assembly separates a single occupancy into different fire areas, the assembly shall have a fire-resistance rating of not less than that required by Section 706.3.9. Floor assemblies separating dwelling units in the same building or sleeping units in occupancies in Group R-1, hotel occupancies, R-2 and I-1 shall be a minimum of 1-hour fire-resistance-rated construction.

> **Exception:** Dwelling unit and sleeping unit separations in buildings of Type IIB, IIIB, and VB construction shall have fire-resistance ratings of not less than 1/2 hour in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G92–06/07
419 (New), 310.1, 508.3.1; IRC R101.2

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing the American Institute of Architects

THIS PROPOSAL IS ON THE AGENDA OF THE IBC GENERAL AND IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES

PART I – IBC

1. Add new text as follows:

SECTION 419
LIVE/WORK UNITS

419.1 General. A live/work unit is a dwelling unit or sleeping unit in which a significant portion of the space includes a non-residential use which is operated by the tenant and shall comply with Section 419.

Exception: Dwelling units or sleeping units which include an office that is less than 10% of the area of the dwelling unit shall not be classified as a live/work unit.

419.1.1 Limitations: The following shall apply to all live/work areas:

1. The live/work unit is permitted to be a maximum of 3,000 sq ft;
2. The non-residential area is permitted to be a maximum 50% of the area of each live/work unit;
3. The non-residential area function shall be limited to the first or main floor only of the live-work unit; and
4. A maximum of 5 non-residential worker or employees are allowed to occupy the non-residential area at any one time.

419.2 Occupancies. Live/work units shall be classified as a Group R-2 occupancy. Separation requirements found in Section 508.3 shall not apply when the live/work unit is in compliance with Section 419. High hazard and storage occupancies shall not be permitted in a live/work unit. The aggregate of storage in the live/work unit shall be limited to 10% of the space dedicated to non-residential activities.

419.3 Means of egress. Except as modified by this section, the provisions for Group R-2 occupancies in Chapter 10 shall apply to the entire live/work unit.

419.3.1 Egress capacity. The egress capacity for each element of the live/work unit shall be based on the occupancy load for the occupancy served in accordance with Table 1004.1.1.

419.3.2 Sliding doors. Where doors in a means of egress are of the horizontal-sliding type, the force to slide the door to its fully open position shall not exceed 50 pounds (220 N) with a perpendicular force against the door of 50 pounds (220 N).

419.3.3 Spiral stairs. Spiral stairs that conform to the requirements of Section 1009.8 shall be permitted.

419.3.4 Locks. Egress doors shall be permitted to be locked in accordance Exception 4 of Section 1008.1.8.3.

419.4 Vertical openings. Floor opening between floor levels of a live/work unit is permitted without enclosure.

419.5 Fire protection. The live-work unit shall be provided with a monitored fire alarm system where required by Section 907.2.9, and a fire sprinkler system in accordance with Section 903.2.7.

419.6 Structural. Floor loading for the areas within a live/work unit shall be designed to conform to Table 1607.1 based on the function within the space.

419.7 Accessibility. The applicable requirements of Chapter 11 shall apply to each area within the live/work unit.

419.8 Ventilation. The applicable requirements of the *International Mechanical Code* shall apply to each area within the live/work unit for the function within that space.

(Renumber subsequent sections)

2. Revise as follows:

310.1 Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the *International Residential Code* in accordance with Section 101.2. Residential occupancies shall include the following:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

Boarding houses (transient)
Hotels (transient)
Motels (transient)

R-2 Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

Apartment houses
Boarding houses (not transient)
Convents
Dormitories
Fraternities and sororities
Hotels (nontransient)
Live/work units

Monasteries
Motels (nontransient)
Vacation timeshare properties

Congregate living facilities with 16 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

R-3 Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two dwelling units.
Adult facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.
Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.
Congregate living facilities with 16 or fewer persons.
Adult and child care facilities that are within a single-family home are permitted to comply with the *International Residential Code.*

R-4 Residential occupancies shall include buildings arranged for occupancy as residential care/assisted living facilities including more than five but not more than 16 occupants, excluding staff.
Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code, or shall comply with the *International Residential Code.*

3. Revise as follows:

508.3.1 Accessory occupancies. Accessory occupancies are those occupancies subsidiary to the main occupancy of the building or portion thereof. Aggregate accessory occupancies shall not occupy more than 10 percent of the area of the story in which they are located and shall not exceed the tabular values in Table 503, without height and area increases in accordance with Sections 504 and 506 for such accessory occupancies.

Exceptions:

1. Accessory assembly areas having a floor area less than 750 square feet (69.7 m^2) are not considered separate occupancies.
2. Assembly areas that are accessory to Group E occupancies are not considered separate occupancies except when applying the assembly occupancy requirements of Chapter 11.
3. Accessory religious educational rooms and religious auditoriums with occupant loads of less than 100 are not considered separate occupancies.
4. <u>Live/work units in accordance with Section 419 are not considered separate occupancies.</u>

PART II – IRC

Revise as follows:

R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above-grade in height with a separate means of egress and their accessory structures.

<u>**Exception:** Live/work units complying with the requirements of Section 419 of the *International Building Code* shall be permitted to be built as one- and two-family dwellings or townhouses. Fire suppression required by Section 419.5 of the *International Building Code* when constructed under the *International Residential Code for One- and Two-family Dwellings* shall conform to Section 903.3.1.3 of the *International Building Code*.</u>

Reason: IBC. This code change creates a live/work unit that is considered to be an R-2 dwelling for application of the code. Several limitations and specific requirements that are to be applied to both the dwelling portion of the unit and the work portion of the unit are itemized. Fire suppression is required throughout a building containing a live/work unit; ventilation and structural requirements must be applied based on the function in the space, and these criteria are applicable whether the unit is in an IBC or IRC building.

The current IBC and IRC do not allow residential live-work units in a form that is typically desirable for community development. This increasingly popular concept of design and construction allows a public service business, with employees working within a residence and allows the public to enter the work area of the unit to acquire service. Some examples of live-work commercial functions are artist's studios, coffee shops and chiropractor's offices. It is important to note that live-work is specifically not to apply to an in home office (architect home office, consultant home office, et al).

These throwbacks to 1900 era planning, created a community where residents could walk to all needed services such as the typical corner commercial store scattered across many old cities. Live-work units began to re-emerge in the 1990's through a development style known as "Traditional Neighborhood Design" (TND). More recently, adaptive reuse of many older urban structures in city centers incorporated the same live-work tools to provide a variety of residential unit types.

Historically, the building codes did not have to deal with the live-work issue by zoning codes which generally precluded a mix of uses within a neighborhood, much less within a building. However, recent planning trends adopted by many jurisdictions, encourage the mixing of commercial and residential uses, not just in neighborhoods, but also in buildings, and even within unit types, such as the live-work unit commonly found in TND projects.

The live-work approach is also driven by the desire to provide affordable housing. Many cities and towns struggle with their revival also driving real estate values up and driving service level citizens out of their community. These jurisdictions want a full range of citizens to be able to both work and live in their community. They aggressively pursue affordable housing, with the *International Residential Code* (IRC) being a key tool in this effort. The IRC allows jurisdictions to produce a range of housing types at competitive market values. Included among these is the live-work unit.

There are no provisions for any use other than residential in the IRC. Since live-work units mix in a commercial use, they are driven out of the IRC, into the IBC. When this happens, the live-work units incur an increase in code related construction requirements (use separation, construction type, egress, fire prevention) far in excess of any risk present in the work function. The added requirements drive the construction cost up, and inevitably drive the units out of the affordable housing range.

The provisions in the IBC are intended to apply to buildings which contain live/work units and would conform in general with the R-2 provisions. In addition, a code change has been proposed to the IRC referencing this section for the criteria that would be appropriate for live/work units built under that code. Obviously, the method by which mixed use unseparated is applied is critical to the usefulness of the live/work concept.

This proposal allows mixed use unseparated occupancies within the dwelling unit or sleeping unit that meets the limits of this section to be classified as an R-2 occupancy. Any occupancy that is not within a dwelling unit would have to be treated as a mixed use condition and would be separated per the IBC. Special features that are common within a dwelling unit and are likely within the live/work unit are addressed in order to clearly delineate the means for designing a live/work unit.

Of concern to many Code Officials and Architects alike is the problem posed by the absence of any live-work provision in the IRC or IBC. Too often, this results in one of two poor choices: a) either the owner misrepresents the proposed “work” use, or b) the Code Officials are encouraged to look the other way, ignoring the “work” use. Consequently, conscientious Code Officials and Architects desire a code compliance tool that addresses their live-work predicament, allowing them to solve this problem as an integral part of a project’s code compliance strategy, while still providing affordable residential units.

IRC. This code change creates a live/work unit that is considered to be an R-2 dwelling for application of the code. Several limitations and specific requirements that are to be applied to both the dwelling portion of the unit and the work portion of the unit are itemized. Fire suppression is required throughout a building containing a live/work unit; ventilation and structural requirements must be applied based on the function in the space, and these criteria are applicable whether the unit is in an IBC or IRC building.

The current IBC and IRC do not allow residential live-work units in a form that is typically desirable for community development. This increasingly popular concept of design and construction allows a public service business, with employees working within a residence and allows the public to enter the work area of the unit to acquire service. Some examples of live-work commercial functions are artist’s studios, coffee shops and chiropractor’s offices. It is important to note that live-work is specifically not to apply to an in home office (architect home office, consultant home office, et al).

These throwbacks to 1900 era planning, created a community where residents could walk to all needed services such as the typical corner commercial store scattered across many old cities. Live-work units began to re-emerge in the 1990’s through a development style known as “Traditional Neighborhood Design” (TND). More recently, adaptive reuse of many older urban structures in city centers incorporated the same live-work tools to provide a variety of residential unit types.

Historically, the building codes did not have to deal with the live-work issue by zoning codes which generally precluded a mix of uses within a neighborhood, much less within a building. However, recent planning trends adopted by many jurisdictions, encourage the mixing of commercial and residential uses, not just in neighborhoods, but also in buildings, and even within unit types, such as the live-work unit commonly found in TND projects.

The live-work approach is also driven by the desire to provide affordable housing. Many cities and towns struggle with their revival also driving real estate values up and driving service level citizens out of their community. These jurisdictions want a full range of citizens to be able to both work and live in their community. They aggressively pursue affordable housing, with the *International Residential Code* (IRC) being a key tool in this effort. The IRC allows jurisdictions to produce a range of housing types at competitive market values. Included among these is the live-work unit.

There are no provisions for any use other than residential in the IRC. Since live-work units mix in a commercial use, they are driven out of the IRC, into the IBC. When this happens, the live-work units incur an increase in code related construction requirements (use separation, construction type, egress, fire prevention) far in excess of any risk present in the work function. The added requirements drive the construction cost up, and inevitably drive the units out of the affordable housing range.

The provisions in the IBC are intended to apply to buildings which contain live/work units and would conform in general with the R-2 provisions. In addition, a code change has been proposed to the IRC referencing this section for the criteria that would be appropriate for live/work units built under that code. Obviously, the method by which mixed use unseparated is applied is critical to the usefulness of the live/work concept.

This proposal allows mixed use unseparated occupancies within the dwelling unit or sleeping unit that meets the limits of this section to be classified as an R-2 occupancy. Any occupancy that is not within a dwelling unit would have to be treated as a mixed use condition and would be separated per the IBC. Special features that are common within a dwelling unit and are likely within the live/work unit are addressed in order to clearly delineate the means for designing a live/work unit.

Of concern to many Code Officials and Architects alike is the problem posed by the absence of any live-work provision in the IRC or IBC. Too often, this results in one of two poor choices: a) either the owner misrepresents the proposed “work” use, or b) the Code Officials are encouraged to look the other way, ignoring the “work” use. Consequently, conscientious Code Officials and Architects desire a code compliance tool that addresses their live-work predicament, allowing them to solve this problem as an integral part of a project’s code compliance strategy, while still providing affordable residential units.

Cost Impact: The code change proposal will increase the cost of construction. There is no way to calculate the actual impact because this is a design concept that is new to the code, and except when it has been allowed through an appeal or variance process, hasn’t been widely used. The criteria are generally limitations that are designed to aid the designer/owner and building official to appropriately use the live/work concept, many of which are already within the code and will have little cost impact (sprinklers/alarms/etc.). The unique feature of this proposal in concert with the proposal to the IRC is the use of the IBC criteria for a building built under the IRC.

Analysis: Regarding the Chapter 11 reference in proposed Section 419.7, would a live/work area be considered part of a dwelling unit in the consideration of the Type A and Type B unit requirements, particularly the multistory dwelling unit exception?

PART I – IBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G93–06/07
419 (New)

Proponent: Ronald Panicucci, PE, LAN Associates, Engineering, Planning, Architecture, Surveying Inc., representing iFortress, Inc.

Add new text as follows:

SECTION 419
MISSION CRITICAL INFRASTRUCTURE INCLUDING COMPONENTS, EQUIPMENT, AND ASSETS

419.1 Scope. The provisions of this section shall apply to the portions of buildings or structures (Mission Critical Facilities) used for the congregation, use, operation or storage of mission-critical information technology components, equipment, and assets (Mission Critical Infrastructure).

419.2 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

INFORMATION TECHNOLOGY COMPONENTS AND EQUIPMENT. Any electronic digital or analog hardware, computer, and telecommunications equipment, along with all peripheral, software, support, application platforms, data, memory, programming, or other directly associated equipment, records, storage, and activities that process electronic information and facilitate automated operations.

MISSION-CRITICAL ASSETS. Those items, materials, property, or goods that are considered essential to the functionality and sustenance of the user.

MISSION-CRITICAL EQUIPMENT. Those systems and equipment that provide for the performance of Vital Business Functions and are essential to ensure operations, safety and health of the building occupants, employees, contractors, visitors, and the public.

VITAL BUSINESS FUNCTIONS. Those business functions, typically involved in revenue generation, customer service or compliance, preservation of public or private investment objectives and commitments, that the loss of which would compromise and be critical to the continuation or survival of the business or entity.

419.3 Risk Considerations. The following factors shall be considered where determining if the information technology equipment is mission-critical to determine the need for the construction requirements of Section 419.4:

1. The uninterrupted equipment function is required for life safety services.
2. Economic loss from interruption or loss of use or function of information technology components, equipment or assets, or the loss of the actual information technology components, equipment and assets.

419.4 Construction requirements. The portions of buildings or structures used for the use, operation or storage of mission-critical information technology components, equipment, and assets shall be constructed to protect equipment from human and environmental consequence such as fire and heat, water, humidity, smoke, acrid gases, radiofrequency electromagnetic interference/electromagnetic pulse, unauthorized access, and dust.

419.4.1 Design loads. Mission-critical information technology equipment shall be enclosed within construction that is engineered to withstand the applicable design loads dictated by the installation and as specified in Chapter 16, Structural Design, to include dead and live loads, snow loads, wind loads and earthquake loads.

419.4.2 Protection from fire and heat. Mission-critical information technology equipment shall be enclosed within fully rated construction that is engineered such to comply with ASTM E119 90 minute rating including the hose stream test along with an ASTM E119 Class 125 Enclosure Rating including penetrations such as doors, ducts, cable, plumbing, and air dampers that, depending on the size of the facility, shall achieve a minimum of a 30 to 90 minute rating, 30 minutes minimum for 400 square feet or less.

419.4.3 Openings or penetrations. All cable openings or other penetrations through enclosures including doors, air dampers, and cable, wire, and plumbing penetrations required by this section shall be equally rated as required by Section 419.4.2, as part of an entire assembly with a minimum positive furnace pressure differential of 2.5 Pa (0.01 in. of water) when tested in accordance with ASTM E 814. All ducts for mechanical equipment shall be provided with automatic fire and smoke dampers where the ducts pass through the required enclosure construction.

(Renumber subsequent sections)

Reason: The purpose of this Code Change Proposal it to provide a new special occupancy code section to provide protection for mission-critical information technology components, equipment, and assets.

Currently, the dependency on the availability of functional mission critical information infrastructures, which facilitate nearly every aspect of the public domain, including economic, health safety services and societal functionality, has become universal. The codes used to establish mission critical facilities have no special provisions for the protection or preservation of mission-critical information technology infrastructure and equipment. By definition, mission-critical information technology infrastructure and equipment are those systems and equipment that are essential to ensure the safety and health of the building occupants, employees, contractors, visitors, and the public. Examples of commercial and life safety systems which can fail or become corrupted at elevated temperatures include communications and phone, fire alarms, sprinkler and fire pump controls, elevator control equipment, or any computer based life safety operational system, many of which need to maintain some level of functionality during these events. In addition to ensuring the safety and health, these systems and equipment provide for the performance of “Vital Business Functions”. Therefore, when current advances in technology place the dependency of these functions in the hands of vital information technology and equipment, the current codes used to construct mission critical facilities may protect the building but are deficient in protecting the infrastructure that supports the building and the “Vital Business Functions” of the businesses that operate within the building. The result is that both public health and safety operations and “Vital Business Functions” are compromised, and therefore, fail when the mission critical facility itself is breached.

Conventional construction codes are based on the thermal combustibility transfer temperature from one surface, the hot surface, to the other, the cold surface. This code will allow for a cold face temperature rise of 250 degrees with no breach of fire (70 degrees F will rise to 320 degrees F and be considered “rated”). The resulting ambient temperatures at these levels far exceed the temperature tolerances of electronic data, media and information technology hardware and software, which are corrupted or permanently lost well below these currently acceptable performance standards.

The following are guidelines concerning sustained high ambient temperatures.

(1) Damage to functioning information technology equipment can begin at a sustained ambient temperature of 79.4°C (175°F) with the degree of damage increasing with further elevations of the ambient temperature and exposure time.

(2) Damage to magnetic tapes, flexible discs, and similar media can begin at sustained ambient temperatures above 37.8°C (100°F). However, damages occurring between 37.8°C (100°F) and 48.9°C (120°F) can generally be reconditioned successfully, whereas the chance of successful reconditioning lessens rapidly with elevations of sustained ambient temperatures above 48.9°C (120°F).

(3) Damage to disc media can begin at sustained ambient temperatures above 65.6°C (150°F) with the degree of damage increasing rapidly with further elevations of sustained ambient temperatures.

Primary damage to electronic equipment is caused by smoke that contains corrosive chloride and sulfur combustion by-products. The particulate residue left after the smoke has dissipated contains the active by-product that will corrode metal contact surfaces in the presence of moisture and oxygen.

Bibliography:

ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E 814, Standard Method of Fire Tests of Through-Penetration Fire Stops
NFPA 75, “Standard for the Protection of Information Technology Equipment”

Cost Impact: The code change proposal will increase the cost of construction on a materials basis. The cost of pre-manufactured structural panels to achieve the proposed code change requirements is greater than conventional building materials such as gypsum wallboard and compressed ceiling tiles.

However, the total square foot construction cost to conventionally build a deck to slab, fire rated wall using two to three layers of gypsum wallboard with vapor barriers is comparable to building the same distance of wall using structural panels. The same analysis though does not hold true when comparing the cost of panels to ceiling tiles.

However, due to the ability to rapidly deploy an assembly of modular panels, the overall project costs may certainly be in parody with conventional construction if not lower due to the cost saving resulting from a reduction in the amount of time and on-site labor required to complete the project.

Additionally, the overall cost of construction of a mission critical facility is not just a function of the details of how the walls and ceiling are constructed. The potential cost savings associated with the important risk reduction gained by protecting mission-critical technologies and assets, and by ensuring the public's safety that depends on the functionality of these technologies and assets should outweigh any increase in the cost of construction as a result of implementing the proposed code changes.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G94–06/07

421 (New), 405.1, Chapter 35

Proponent: Michael Lodespoto, AIA, MTA, New York City Transit, representing New York State

1. Add new text as follows:

<u>SECTION 421</u>
<u>FIXED GUIDEWAY TRANSIT SYSTEM BUILDINGS</u>

<u>**421.1 Fixed guideway transit system buildings.** In buildings that are for fixed guideway transit system stations compliance with NFPA 130 shall be permitted to be approved to meet the requirements for the fire protection system and means of egress provisions of this code.</u>

2. Revise as follows:

405.1 General. The provisions of this section apply to building spaces having a floor level used for human occupancy more than 30 feet (9144 mm) below the lowest level of exit discharge.

Exceptions:

1. One- and two-family dwellings, sprinklered in accordance with Section 903.3.1.3.
2. Parking garages with automatic sprinkler systems in compliance with Section 405.3.
3. ~~Fixed guideway transit systems~~
4. ~~4.~~ 3. Grandstands, bleachers, stadiums, arenas and similar facilities.
5. ~~5.~~ 4. Where the lowest story is the only story that would qualify the building as an underground building and has an area not exceeding 1,500 square feet (139 m^2) and has an occupant load less than 10.

3. Add standard to Chapter 35 as follows:

NFPA
130-03 Standard for Fixed Guideway Transit and Passenger Rail Systems

Reason: NFPA 130 was written for the subway stations, but the code has not included it in its referenced standards. NFPA 130 deals with subway or Rapid Transit systems as a system; evaluating the occupant loads, subway construction, known fire hazards, and travel times. Essentially, a subway car is a rolling assembly occupancy that, by virtue of entering and exiting the station, changes the occupant load without actually entering the station through an egress door. It seems strange to think the IBC applies to a subway station since it is outside the scope of 'traditional buildings', but it does and has been problematic for this agency to deal with. Of importance, the NYC Transit System is not the only subway system in the country that would be applicable to the IBC. With the growth of transit systems and the increased utilization of automatic transit systems (i.e. terminal connectors at airports), NFPA 130 is the next step needed to apply the right requirements to the right situation. Currently, the IBC does not provide for this increasing issue.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: Results of review of the proposed standard will be posted on the ICC Website by August 20, 2006.

Public Hearing:				
	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G95–06/07
Chapter 5

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing the American Institute of Architects

DELETE CURRENT CHAPTER 5 IN ITS ENTIRETY AND SUBSTITUTE AS FOLLOWS:

CHAPTER 5
GENERAL BUILDING HEIGHTS AND AREAS

SECTION 501
GENERAL

501.1 Scope. The provisions of this chapter control the height of structures hereafter erected and additions to existing structures.

[F] 501.2 Address numbers. Buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numerals or alphabetical letters. Numbers shall be a minimum of 4 inches (102 mm) high with a minimum stroke width of 0.5 inch (12.7 mm).

SECTION 502
DEFINITIONS

502.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

AREA, BUILDING. The area included within surrounding Exterior walls (or exterior walls and firewalls) exclusive of vent shafts and courts. Areas of the building not provided with surrounding walls shall be included in the building area if such areas are included within the horizontal projection of the roof or floor above.

BASEMENT. That portion of a building that is partly or completely below grade plane (see "Story above grade plane" in Section 202). A basement shall be considered as a story above grade plane where the finished surface of the floor above the basement is:

1. More than 6 feet (1829 mm) above grade plane; or

2. More than 12 feet (3658 mm) above the finished ground level at any point.

EQUIPMENT PLATFORM. An unoccupied, elevated platform used exclusively for mechanical systems or industrial process equipment, including the associated elevated walkways, stairs and ladders necessary to access the platform (see Section 504.5).

GRADE PLANE. A reference plane representing the average of finished ground level adjoining the building at exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building.

HEIGHT, BUILDING. The vertical distance from grade plane to the average height of the highest roof surface.

HEIGHT, STORY. The vertical distance from top to top of two successive finished floor surfaces; and, for the topmost story, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

MEZZANINE. An intermediate level or levels between the floor and ceiling of any story and in accordance with Section 505.

SECTION 503
GENERAL HEIGHT LIMITATIONS

503.1 General. The height for buildings of different construction types shall be governed by the limits in Table 503 except as modified hereafter. Each part of a building included within the exterior walls or the exterior walls and fire walls where provided shall be permitted to be a separate building.

503.1.1 Special industrial occupancies. Buildings and structures designed to house special industrial processes that require unusual heights to accommodate craneways or special machinery and equipment, including, among others, rolling mills; structural metal fabrication shops and foundries; or the production and distribution of electric, gas or steam power, shall be exempt from the height limitations of Table 503.

TABLE 503
BUILDING HEIGHT LIMITS

	TYPE IA	**TYPE IB**	**TYPE IIA**	**TYPE IIB**	**TYPE IIIA**	**TYPE IIIB**	**TYPE IV**	**TYPE VA**	**TYPE VB**
Height	UL	160	65	55	65	55	65	50	40

SECTION 504
MEZZANINES

504.1 General. A mezzanine or mezzanines in compliance with Section 504 shall be considered a portion of the story below. The area of the mezzanine shall be included in determining the fire area defined in Section 702. The clear height above and below the mezzanine floor construction shall not be less than 7 feet (2134 mm).

504.2 Area limitation. The aggregate area of a mezzanine or mezzanines within a room shall not exceed one-third of the floor area of that room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the mezzanine is located. In determining the allowable mezzanine area, the area of the mezzanine shall not be included in the floor area of the room.

Exceptions:

1. The aggregate area of mezzanines in buildings and structures of Type I or II construction for special industrial occupancies in accordance with Section 503.1.1 shall not exceed two-thirds of the area of the room.
2. The aggregate area of mezzanines in buildings and structures of Type I or II construction shall not exceed one-half of the area of the room in buildings and structures equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 and an approved emergency voice/alarm communication system in accordance with Section 907.2.12.2.

504.3 Egress. Each occupant of a mezzanine shall have access to at least two independent means of egress where the common path of egress travel exceeds the limitations of Section 1014.3. Where a stairway provides a means of exit access from a mezzanine, the maximum travel distance includes the distance traveled on the stairway measured in the plane of the tread nosing. Accessible means of egress shall be provided in accordance with Section 1007.

Exception: A single means of egress shall be permitted in accordance with Section 1015.1.

504.4 Openness. A mezzanine shall be open and unobstructed to the room in which such mezzanine is located except for walls not more than 42 inches (1067 mm) high, columns and posts.

Exceptions:

1. Mezzanines or portions thereof are not required to be open to the room in which the mezzanines are located, provided that the occupant load of the aggregate area of the enclosed space does not exceed 10.
2. A mezzanine having two or more means of egress is not required to be open to the room in which the mezzanine is located if at least one of the means of egress provides direct access to an exit from the mezzanine level.
3. Mezzanines or portions thereof are not required to be open to the room in which the mezzanines are located, provided that the aggregate floor area of the enclosed space does not exceed 10 percent of the mezzanine area.
4. In industrial facilities, mezzanines used for control equipment are permitted to be glazed on all sides.
5. In other than Groups H and I occupancies no more than two stories in height above grade plane and equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, a mezzanine having two or more means of egress shall not be required to be open to the room in which the mezzanine is located.

504.5 Equipment platforms. Equipment platforms in buildings shall not be considered as a portion of the floor below. Such equipment platforms shall not contribute to the number of stories as regulated by Section 503.1. The area of the equipment platform shall not be included in determining the fire area. Equipment platforms shall not be a part of any mezzanine and such platforms and the walkways, stairs and ladders providing access to an equipment platform shall not serve as a part of the means of egress from the building.

504.5.1 Area limitations. The aggregate area of all equipment platforms within a room shall not exceed two-thirds of the area of the room in which they are located. Where an equipment platform is located in the same room as a mezzanine, the area of the mezzanine shall be determined by Section 504.2 and the combined aggregate area of the equipment platforms and mezzanines shall not exceed two-thirds of the room in which they are located.

[F] 504.5.2 Fire suppression. Where located in a building that is required to be protected by an automatic sprinkler system, equipment platforms shall be fully protected by sprinklers above and below the platform, where required by the standards referenced in Section 903.3.

504.5.3 Guards. Equipment platforms shall have guards where required by Section 1013.1.

Reason: Building areas have historically been included in model building codes but were never included in the life safety codes. The wide disparity among the codes as to what limits were appropriate and the huge number of exceptions that are included for virtually every occupancy raises serious doubts as to the appropriateness of such regulation.

NFPA established a task group to examine the appropriateness of height and area limits when it decided to create a building code. A concerted effort by a large number of experts examining a large volume of data could not determine that there was any relationship between the area limits for construction and the life safety of persons in a building. Model codes have instituted various limits for the most critical elements of life safety which not only assure building occupants of a safe environment, but also assure their ability to escape any probable danger. Some of these features are:

Fire area limits requiring fire suppression;
Fire department vehicle access;
Number of floors requiring standpipes;
Area limits for alarm devices; and
Travel distance limits.

Each of these in their own way control the configuration of a building.

The definitions for Height, Story and Mezzanine, as well as the criteria for mezzanines remain in the code because so many criteria are based on the number of stories and the need to understand that a mezzanine is to be included as part of a fire area. (I have been toying with the idea of moving this to Chapter 4 as a special design condition, not an height and area condition). The reference to area limitations throughout the code should be editorially removed since there are no area limits as proposed in this rewrite of Chapter 5.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G96–06/07

501.3 (New) (IFC 505.2)

Proponent: Robert J. Davidson, Davidson Code Concepts, representing himself

Add new text as follows:

[F] 501.3 (IFC 505.2) Street or road signs. Streets and roads shall be identified with approved signs. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicles. Signs shall be of an approved size, weather resistant and be maintained until replaced by permanent signs.

Reason: This proposal provides correlation between the International Building Code and the International Fire Code by copying existing language from the IFC into the IBC.

Since the standards premise identification are already in the IBC, the requirements for street or road signs currently in the IFC at Section 505.2 should also be located in the IBC for ease of use. If we are to require the address to be posted at the time of construction we should also require the street signs that are needed to find the location.

This addition to the IBC will also solve a problem that is occurring in jurisdictions that adopt the IBC as the only construction document and adopt the IFC or another code as a maintenance document. In some cases the plan reviewers and inspectors performing the construction related duties are not referring to the requirements found in the IFC at the time of construction. This is exacerbated by this particular section being located in Chapter 5 of the IFC as compared to Chapter 9 where most experienced construction code officials would look for them.

Recognizing the multitude of different ways that the IBC, the IFC, or both are adopted and enforced, these codes must work either together or separately to accomplish the desired result.

This effort was initiated by an action item from ICC's Federal Agency Codes and Standards Forum. There is a need for this in jurisdictions without the IFC, and this change will streamline the design process in jurisdictions where both codes are in effect.

Cost Impact: The code change proposal will not increase the cost of construction

Analysis: The maintenance of the technical content of the Section in the proposal rests with the IFC Code Development Committee. The need for suitability and duplication of the language within the IBC is a matter to be determined by the IBC General Code Development Committee.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G97–06/07
502.1

Proponent: Philip Brazil, PE, Reid Middleton, Inc., representing himself

Revise definition as follows:

502.1 Definitions. The followingwords and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

GRADE PLANE. A reference plane representing the average of finished ground level adjoining the building at exterior walls. Where areas of the building are not provided with exterior walls, finished ground level shall be measured directly below the edge of the roof or floor above that establishes the area. Where the finished ground level slopes away from the ~~exterior walls~~ building, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building.

Reason: The definition of grade plane considers finished ground level at the exterior walls of a building but is silent about areas of the building without surrounding exterior walls. The proposal will add language specifying how to establish the location of finished ground level at areas of the building without surrounding exterior walls. Note that the definition of building area (see Section 502.1) includes consideration of areas of the building without surrounding exterior walls.

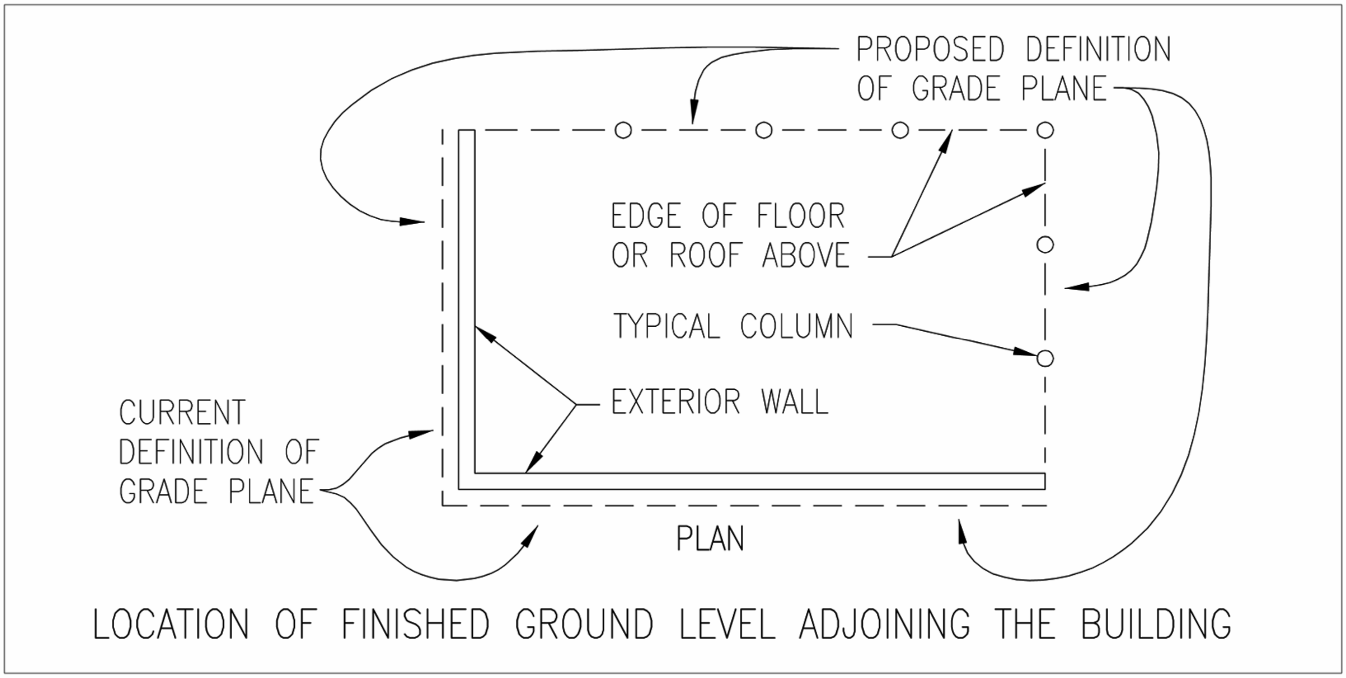
Imagine a building rectangular in shape. Exterior walls are present along the entire length of north and east exterior elevations. There are no exterior walls along the length of the south and west exterior elevations. According to the current definition of "grade plane," the finished ground surface would be located at the exterior side of the north and east exterior walls for the north and east exterior elevations and the interior side the north and east exterior walls for the south and west exterior elevations.

The determination of building area is at least partly based on the number of stories above grade plane. The determination of the type of construction is at least partly based on the building area. It is reasonable to expect that the determination of grade plane, which leads to the determination of building area, which leads to the determination of type of construction, should include consideration of areas of the building without surrounding exterior walls.

A diagram accompanies this proposal. It illustrates the location of the finished ground level for a building open on two adjoining elevations and with exterior walls on the two opposite adjoining elevations. With the current definition, grade plane would be determined by the location of the finished ground level only at the two adjoining exterior walls. With the proposed revisions to the definition, grade plane would be determined by the location of the finished ground level at a combination of:

1. The exterior walls where they are provided, and
2. At a vertical plane along the edge of the roof or floor above that establishes areas of the building area without exterior walls.

Measuring form the vertical plane at the edge of a roof or floor above does not occur unless there are areas of the building without exterior walls. The vertical plane at these areas is a consequence of meeting the definition of building area. If, in applying the definition of building area, areas of the building without exterior walls are not determined to be part of the building area, there is no vertical plane to measure from.



Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G98–06/07
502.1

Proponent: Maureen Traxler, City of Seattle, WA, epresenting the Washington Association of Building Officials

Delete definition without substitution:

502.1 Definitions. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

~~**HEIGHT, STORY.** The vertical distance from top to top of two successive finished floor surfaces; and, for the topmost story, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.~~

Reason: The purpose of this code change proposal is to delete an unnecessary definition. The definition of "story" contains the same information as the definition of "story height". Furthermore, the term "story height" is used only once in the 2006 IBC. It is used in Section 2106.5.2 in the context of design of masonry shear walls in high Seismic Design Categories. If this definition is needed, it should be moved to Chapter 21.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G99–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
A-1	S A	UL UL	~~5~~ 4 ~~UL~~ 29,900	~~3~~ 2 ~~15,500~~ 13,500	~~2~~ NP ~~8,500~~ NP	~~3~~ 2 ~~14,000~~ 13,500	~~2~~ NP ~~8,500~~ NP	~~3~~ 2 ~~15,000~~ 13,500	2 ~~11,500~~ 10,500	~~1~~ NP ~~5,500~~ NP

(Portions of table not shown do not change)

Reason: Our society tends to address fire safety after tragedies occur. Chicago's Iroquois Theater Fire claimed 602 lives on December 30, 1903. Ironically, the Iroquois was billed as a "fire proof" theater. It was the worst single-building fire in U.S. history, and even though it was more than a century ago, the lessons learned in that fire have motivated generations of public safety officials to be mindful of the extraordinary loss of life that is possible in Group A-1 occupancies.[1]

The fact that we have not had a second Iroquois Theater fire is testimony to the fact that we stopped believing in slogans like "fire proof" and have continuously adopted more effective fire safety requirements, as we better understand how fires ignite and spread in the real world. No single fire safety technology is sufficiently effective and reliable. If so, fire resistant stage curtains would have solved the problem following the Iroquois fire.

Moreover, Group A-1 occupancies are, by definition, places utilized by large numbers of persons. Firefighters have little choice but to initiate rescue operations in the event of significant fires. The decision by the International Building Code (IBC) to allow taller, larger buildings with less fire protection means that responders must climb higher and travel further into hostile conditions, yet are given less time to do so before risking structural collapse. The well-tested fire protection requirements contained in the three Legacy Codes were a critical part of a strategy that has helped protect the patrons and staff of theater and other Group A-1 occupancies for a long time. *In reducing and modifying those well-tested requirements, the IBC proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group A-1 of Table 503 to those in the Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger Group A-1 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group A-1 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive, than comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

A-1 Base Tabular Values Table 503		
	Type III	
	A	**B**
IBC 2003	S 3 A 14,000	2 8,500
BOCA 1999	S 3 A 11,550	2 8,400
SBC 1997	S 1 A 10,000	1 6,000
UBC 1997	S 2 A 13,500	NP NP

NP = Not Permitted

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group A-1 tabular values in Table 503 are the starting point for a design process that moves through many other steps some of which are the subject of other code proposals. But, the Group A-1 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group A-1 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.
2. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]
3. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.
   In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.
   More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.
   According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]
4. *In Group A-1 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the patrons and staff they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at Group A-1 occupancies.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often assembly occupancies. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In the event of significant fires in Group A-1 occupancies, large numbers of persons are likely to require rescues. Since 1988, the number of screens in movie theaters has risen from 23,129 to 37,185, a 61 percent increase, according to the National Association of Theater Owners (NATO). At the same time, theater admissions rose 36 percent to 1.47 billion from 1.08 billion. NATO doesn't track the number of seats per theater, according to a spokesman. But, if you assume 225 seats per screen and four showings per day, there are 12.2 billion total available seats in theaters nationwide. Clearly, many movies do not pack theaters, but some do. A significant fire at a multiple-screen theater could affect more than 1,500 persons.[10]

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group A-1 occupancies but may not be sufficient for extended outages. Emergency energy is not required for all A-1 facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group A-1 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland. Obviously, a Group A-1 occupancy without electricity will not be in a position to offer entertainment, but A-1 occupancies are often used to shelter persons in storms.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[11] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[12] Recalled heads have been found in Group A-1 occupancies. In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in those facilities that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads which remain formally listed and therefore technically in compliance with the Model Codes.13 Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new theater, arena and other Group A-1 occupancy constructed in compliance with the Group A-1 tabular values in Table 503 is an experiment in safety. According to industry sources, we have fewer theaters today but they are individually much larger. In 1995, the NATO reported that there were 7,151 theaters with a total of 26,995 screens attracting 1.26 billion patrons. For 2004, NATO reported that there were 5,629 theaters with 36,012 screens serving 1.53 billion patrons. We can have confidence in the safety of the A-1 occupancies built in compliance with the Legacy Codes, but every theater constructed to the IBC relies on the unknown. Restoration of the Group A-1 tabular values of the UBC in this cycle is critical.[14]

Endnotes and Bibliography:
[1]*Iroquois Theater Fire.* (1904). Retrieved from: http://en.wikipedia.org/wiki/Iroquois_Theater
[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464.* American Society for Testing and Materials. pp 106-126.
[3]*Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf
[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm
[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf
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[12]Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm
[13] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.
[14]*Number of US Cinema Sites.* National Association of Theater Owners. Retrieved from: http://www.natoonline.org/statisticssites.htm

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G100–06/07

Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
A-2	S	UL	~~11~~ 12	~~3~~ 2	~~2~~ 1	~~3~~ 2	~~2~~ 1	~~3~~ 2	2	1
	A	UL	~~UL~~ 29,900	~~15,500~~ 13,500	~~9,500~~ 9,100	~~14,000~~ 13,500	~~9,500~~ 9,100	~~15,000~~ 13,500	~~11,500~~ 10,500	6,000

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most Group A-2 occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group A-2 of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger Group A-2 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group A-2 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with – and certainly no less restrictive than – comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

A-2 Base Tabular Values Table 503		
	Type III	
	A	B
IBC 2003	S 3 A 14,000	2 9,500
BOCA 1999	S 2 A 3,300	1 2,400
SBC 1997	S 2 A 12,000	2 8,000
UBC 1997	S 2 A 13,500	1 9,100

NP = Not Permitted

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group A-2 tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group A-2 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group A-2 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.
2 *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]
3. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.
   In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.
   More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.
   According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection."[5]
4. *In Group A-2 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance earlier in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the customers and staff that they hope to rescue increases exponentially.*
   In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."
   However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at restaurants and nightclubs and other Group A-2 occupancies nationwide. Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often assembly occupancies. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: Serious restaurant and nightclub fires are rare. But when they occur, large numbers of persons are likely to require rescues. In its Topical Research Series, the United States Fire Administration (USFA) concisely stated the challenge with Group A-2 occupancies. In its report on nightclub fires, USFA wrote, "Among all structure fires, nightclub fires in the U.S. are proportionately few in number (0.03 percent). However, maximum or over-capacity crowds at popular nightclubs create the potential for high numbers of casualties in the event of a fire." USFA observes that, "Patrons who have been drinking alcohol during the evening may not be able to respond quickly or be able to recognize the safest exit from the building." USFA also notes that incendiary fires are twice as likely in nightclubs as in other occupancies. In its report on restaurant fires, the USFA concisely described the challenge by stating, "Restaurants pose unique risks in that they gather a potentially large number of customers at one time while engaging in cooking activities that inherently pose a risk of fire."[10]

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group A-2 occupancies may not be sufficient for extended outages. Emergency energy is not required for all Group A-2 facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group A-2 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[11] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[12] Recalled heads have been found in Group A-2 occupancies. In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in those restaurants, nightclubs and other Group A-2 occupancies that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[13] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new restaurant and nightclub constructed in compliance with the Group A-2 tabular values in Table 503 is an experiment in safety. Adoption in this cycle is critical.

Endnotes and Bibliography:

[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.*National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464,* American Society for Testing and Materials. pp 106-126.

[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf

[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm

[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf

[6] "Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures" NIOSH Publication No. 2005-132, May 2005. Retrieved from: http://www.cdc.gov/niosh/docs/2005-132/#sum

[7] *Firefighters*. (2005, February 1). United States Fire Administration. Retrieved from: http://www.usfa.fema.gov/statistics/firefighters/

[8] *Law Enforcement Statistics*. (2005, October 17). Bureau of Justice Statistics. Retrieved from: http://www.ojp.usdoj.gov/bjs/lawenf.htm.

[9] *Emergency Medical Technicians and Paramedics*. (2004). Bureau of Labor Statistics. Retrieved from: http://www.bls.gov/oco/ocos101.htm.

[10] *Nightclub Fires in 2000* (2004, June). U.S. Fire Administration and National Fire Data Center. Topical Research Series. Volume 3, Issue 7. Retrieved from: http://www.usfa.fema.gov/downloads/pdf/tfrs/v3i7.pdf

[11] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.* (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1

[12] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm

[13] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G101–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		**TYPE II**		**TYPE III**		**TYPE IV**	**TYPE V**	
		A	**B**	**A**	**B**	**A**	**B**	**HT**	**A**	**B**
	Hst(S)	**UL**	**160**	**65**	**55**	**65**	**55**	**65**	**50**	**40**
A-3	**S** **A**	UL UL	~~11~~ 12 ~~UL~~ 29,900	~~3~~ 2 ~~15,500~~ 13,500	~~2~~ 1 ~~9,500~~ 9,100	~~3~~ 2 ~~14,000~~ 13,500	~~2~~ 1 ~~9,500~~ 9,100	~~3~~ 2 ~~15,000~~ 13,500	2 ~~11,500~~ 10,500	1 6,000

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most churches, synagogues, mosques and other Group A-3 occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group A-3 of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

NASFM is fully committed to the safety of all A-3 occupancies but, through this proposal, asks the IBC to give special consideration to the safety of people at worship, and the many others who rely on churches, synagogues and mosques for day care, education, feeding programs and temporary shelter for the economically disadvantaged.

Justification 1: The IBC currently allows construction of taller, larger Group A-3 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group A-3 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

A-3 Base Tabular Values Table 503		
	Type III	
	A	**B**
IBC 2003	S 3 A 14,000	2 9,500
BOCA 1999	S 3 A 11,550	2 8,400
SBC 1997	S 1 A 12,000	1 8,000
UBC 1997	S 2 A 13,500	1 9,100

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group A-3 tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group A-3 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In churches, synagogues, mosques and other A-3 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.
2. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]
3. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

   In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

   More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

   According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]
4. *Because of the nature of Group A-3 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the worshippers and other persons they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at churches, synagogues, mosques and other A-3 occupancies

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often religious places of assembly. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In spite of significant progress with arson prevention, fires in churches, synagogues, mosques and other religious institutions continue to be a significant concern, costing congregations an estimated $96.3 million annually. According to the NFPA, between 1999 and 2002, an estimated average of 1,760 religious and funeral property structures fires were reported to U.S. fire departments per year – all but 4 percent in religious occupancies. The fires caused an annual average of one civilian death, 20 civilian injuries and $96.3 million in direct property damage. Intentional fires in religious and funeral properties fell 82 percent from 1,320 in 1980 to 240 in 2001 and 2002. Except for a 27 percent jump from 1995 to 1996, intentional fires have generally been declining.[10] The accidental fire trends in places of worship remain troubling, especially given the heavy, on-going use being made of these occupancies for child and adult day care.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect.
Automatic sprinkler systems are certainly the first line of defense. Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group A-3 occupancies may not be sufficient for extended outages. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group A-3 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland. In fact, places of worship and other Group A-3 occupancies are used as shelters in major storms. According to *Baptist Press* in the days preceding Hurricane Katrina, "Baptist churches and association buildings across the region were being opened as shelters for those fleeing the storm, including Parkway Baptist Church in Natchez, Miss., which is housing about 350 people, mostly from the New Orleans area."[11] According to Internet postings following the storm from Natchez, "We lost electricity from Monday to Thursday night and lost water part of that time." [12]
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[13] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[14] In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in those Group A-3 facilities that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[15] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new church, synagogue, mosque and other A-3 occupancy constructed in compliance with the Group A-3 tabular values in Table 503 is an experiment in safety.

Places of worship alone account for more than $8 billion per year in construction, which is increasingly in compliance with the IBC. Because of high land costs, churches in the most densely populated regions of the United States are being built taller to accommodate day care facilities, classrooms, meeting halls, offices and sanctuaries. In its *Construction Outlook 2006*, Associated Builders and Contractors issued the following projection,

As the U.S. population continues to grow, so does the demand for places of worship. FMI forecasts that $8.2 billion in religious facility construction was put-in-place in 2005, a 2 percent rise over 2004. As the home-building frenzy continues, expect religious facility construction to follow suit on a smaller basis. FMI expects $8.4 billion will be spent nationally on religious construction in 2006, followed by a 2 percent increase in 2007. As metropolitan areas become increasingly built-out, suburban and rural locales across the county will witness the most dramatic construction activity.

Regionally, the South leads all U.S. regions in church construction. This trend mirrors the overall population growth experienced in the region, which includes four of the top five fastest-growing states in the country (Florida, Texas, Georgia, and North Carolina, respectively). By 2015, each of these states is predicted to grow an average of 20 percent.

Regional trends are evident in church construction. For example, typically in the South, churches are built "out" not "up." The chief explanation for this is more land is available. In more densely populated areas of the country, such as New England and the Mid-Atlantic, building "out" is not an option. Land costs in these areas are excessive, and as such, limit congregations to building vertically.[16]

Adoption in this cycle is critical.

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[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464,* American Society for Testing and Materials. pp 106-126.

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[13] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1

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[15] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

[16] *2006 Construction Outlook*. Associated Builders and Contractors. Retrieved from: http://www.abc.org/wmspage.cfm?parm1=2760

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G102–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
B	S A	UL UL	~~11~~ 12 ~~UL~~ 39,900	~~5~~ 4 ~~37,500~~ 18,000	~~4~~ 2 ~~23,000~~ 12,000	~~5~~ 4 ~~28,500~~ 18,000	~~4~~ 2 ~~19,000~~ 12,000	~~5~~ 4 ~~36,000~~ 18,000	3 ~~18,000~~ 14,000	2 ~~9,000~~ 8,000

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most Group B occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group B of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger office buildings with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group B occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

B Base Tabular Values Table 503		
Type III		
	A	B
IBC 2003	S 5 A 28,500	4 19,000
BOCA 1999	S 4 A 19,800	3 14,400
SBC 1997	S 5 A 21,000	2 14,000
UBC 1997	S 4 A 18,000	2 12,000

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group B tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group B tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group B occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

2. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

3. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires, but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]

4. *In Group B occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the workers they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at any of the tens of thousands of multi-story office buildings nationwide.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often business occupancies. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In the event of significant fires in Group B occupancies, large numbers of persons are likely to require rescues. More than 17 million non-institutionalized adults between the ages of 16 and 64 possess a sensory, physical or mental disability.[10] Of these, about 36 percent – or about 6.1 million – are employed[11] and would be likely to require rescues in the event of significant fires.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group B occupancies may not be sufficient for extended outages. Emergency energy is not required for all office buildings. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including many Group B occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[12] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[13] Recalled heads have been found in Group B occupancies. In spite of a significant effort to replace defective heads in Group B occupancies, no one knows how many more recalled heads remain to be discovered in those office buildings that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[14] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new office building constructed in compliance with the Group B tabular values in Table 503 is an experiment in safety. In 2004, office construction resumed the annual rate of growth disrupted for three years by the events of September 11, 2001, and the number of buildings over 25 stories doubled from 3 percent of all office construction in 2000 to 6 percent in 2004.[15] Taller, larger office buildings – and the workers who use them – will be more challenging to protect from fire. Adoption in this cycle is critical.

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[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm
[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf
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[14] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.
[15] Young, N. W. (2005, May). *Office Construction Analysis.* Construction Industry Intelligence Report. Retrieved from: http://dodge.construction.com/Analytics/CIIR/CIIR_May2005.pdf

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G103–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
E	S A	UL UL	~~5~~ 4 ~~UL~~ 45,200	~~3~~ 2 ~~26,500~~ 20,200	~~2~~ 1 ~~14,500~~ 13,500	~~3~~ 2 ~~23,500~~ 20,200	~~2~~ 1 ~~14,500~~ 13,500	~~3~~ 2 ~~25,500~~ 20,200	~~1~~ 2 ~~18,500~~ 15,700	1 ~~9,500~~ 9,100

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most schools that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group E of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger schools with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group E occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

E Base Tabular Values Table 503			
Type III			
		A	B
IBC 2003	S A	3 23,500	2 14,500
BOCA 1999	S A	3 19,800	2 14,400
SBC 1997	S A	2 18,000	1 12,000
UBC 1997	S A	2 20,200	1 13,500

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group E tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group E tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group E occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

5. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

6. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

7. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]

8. *In Group E occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance earlier in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the students, faculty members and visitors that they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at schools and other Group E occupancies nationwide.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often educational occupancies. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: School fires are common. When fires occur in Group E occupancies, large numbers of persons are likely to require rescues. In 2002, some 14,300 fires at non-adult schools were reported to fire departments. About 6,000 were structural fires. Reported property damage was in excess of $103 million. There were no deaths, but with 122 injuries, the rate of injuries per 1,000 school fires is relatively high with 22 per 1,000 school fires versus 14.4 for other non-residential occupancies.[10]

An estimated 72 million children attended U.S. schools in 2005, and of those, 31.6 million were enrolled in elementary and middle schools – populations most likely to require some level of rescue in the event of fires.[11]

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect.
Automatic sprinkler systems are certainly the first line of defense. Sprinkler systems have proven their value countless times. However, failure to

properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group E occupancies, may not be sufficient for extended outages. Emergency energy is not required for all educational facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group E occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[12] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[13] Recalled heads have been found in schools. In spite of a significant effort to replace defective heads in Group E occupancies, no one knows how many more recalled heads remain to be discovered in those school buildings that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[14] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new school constructed in compliance with the Group E tabular values in Table 503 is an experiment in safety. Billions of dollars are being spent to construct new schools, increasingly in compliance with the fire protection measures in the IBC's current Table 503. According to industry sources**,** $12.7 billion in new school projects were completed in 2005, $12.4 billion are projected for completion in 2006 and another $11.8 billion in new school construction will begin in 2006.[15] Adoption in this cycle is critical.

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[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.*National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464,* American Society for Testing and Materials. pp 106-126.

[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf

[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm

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[6] "Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures" NIOSH Publication No. 2005-132, May 2005. Retrieved from: http://www.cdc.gov/niosh/docs/2005-132/#sum

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[9] *Emergency Medical Technicians and Paramedics*. (2004). Bureau of Labor Statistics. Retrieved from: http://www.bls.gov/oco/ocos101.htm.

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[13] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm

[14] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

[15] Table 1, p C-3, Abranson, P. (2006). *Annual Construction Report: 2006* (Rep. No. 11th). School Planning and Management. Retrieved from: http://www.peterli.com/global/pdfs/SPMConstruction2006.pdf

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G104–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals, Washington, DC

Revise as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
I-1	S A	UL UL	~~9~~ 3 ~~55,000~~ 15,100	~~4~~ 2 ~~19,000~~ 6,800	~~3~~ NP ~~10,000~~ NP	~~4~~ 2 ~~16,500~~ 6,800	~~3~~ NP ~~10,000~~ NP	~~4~~ 2 ~~18,000~~ 6,800	~~3~~ 2 ~~10,500~~ 5,200	~~2~~ NP ~~4,500~~ NP

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most assisted living, convalescent and other Group I-1 occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group I-1 of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger Group I-1 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group I-1 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

I-1 Base Tabular Values Table 503		
	Type III	
	A	B
IBC 2003	S 4 A 16,500	3 10,000
BOCA 1999	S 4 A 11,550	3 8,400
SBC 1997	S N/A A	N/A
UBC 1997	S 2 A 6,800	NP NP

NP = Not Permitted

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group I-1 tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group I-1 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In assisted living, convalescent and other Group I-1 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

9. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

10. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

11. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires, but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]

12. *More than with almost any other occupancy, with assisted living and convalescent facilities, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification,, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the residents and staff that they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at Group I-1 occupancies.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often supervised institutional care facilities. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In the event of significant fires in Group I-1 occupancies, large numbers of persons are likely to require rescues. Slightly over 5 percent of the United States' 65+ population – approximately 1.5 million persons[10] – occupy an estimated 16,032 nursing homes, congregate care and board and care homes.[11] In addition, more than 600,000 older Americans live in an estimated 28,000 assisted-living facilities.[12] Another 600,000 reside in hospices.[13] The NFPA reports about 3,000 fires annually in these occupancies.[14] Many persons in this category are physically or mentally challenged, and are unable to escape without assistance.

In its September 2005 analysis of "Day Care/Adult Care/Assisted Living," the ICC's Code Technology Council raised numerous questions about the safety of Group I-1 occupancies, including the worrisome findings of "poorly trained and overworked staff," and lack of standardized approaches to supervision.[15] These conditions add to the risk and complexity of rescues in Group I-1 occupancies.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group I-1 occupancies but may not be sufficient for extended outages. Emergency energy is not required for all personal care facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group I-1 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland. At U.S. Senate hearings on the aftermath of Katrina, witnesses told of "patients (who) sat in hospitals and nursing homes for days without electricity, fuel, air-conditioning or sufficient food." [16]
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[17] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some

claims of property loss have been made related to fires in buildings found to contain the recalled heads.[18] Recalled heads have been found in Group I-1 occupancies. In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in those assisted living, convalescent and other Group I-1 occupancies that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[19] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new assisted living, convalescent and other I-1 occupancy constructed in compliance with the Group I-1 tabular values in Table 503 is an experiment in safety. In May 2005, the Construction Industry Intelligence Report[20] cited 13,000 active projects and speaks of "remarkable stability" in health care construction in spite of increased costs of steel and energy. The report also noted the construction "opportunity" created by a rapidly aging population. Adoption of this proposal in this cycle is critical to the safety of the residents of Group I-1 occupancies that will be built in the next few years.

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[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464,* American Society for Testing and Materials. pp 106-126.

[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf

[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm

[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf

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[17] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1

[18] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from : http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm

[19] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

[20] Young, N. W. (2005, May). *A Look at Health Care Design and Construction Activity.* Construction Industry Intelligence Report. Retrieved from: http://dodge.construction.com/Analytics/CIIR/CIIR_May2005.pdf

Cost Impact: This code change proposal will increase the cost of construction.

Public Hearing:				
	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G105–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals, Washington, DC

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet) / Hst(S)	TYPE OF CONSTRUCTION								
		TYPE I		**TYPE II**		**TYPE III**		**TYPE IV**	**TYPE V**	
		A	**B**	**A**	**B**	**A**	**B**	**HT**	**A**	**B**
		UL	**160**	**65**	**55**	**65**	**55**	**65**	**50**	**40**
I-2	**S** **A**	UL UL	~~4~~ <u>3</u> ~~UL~~ <u>15,100</u>	~~2~~ <u>1</u> ~~15,000~~ <u>6,800</u>	~~1~~ <u>NP</u> ~~11,000~~ <u>NP</u>	1 ~~12,000~~ <u>6,800</u>	NP NP	1 ~~12,000~~ <u>6,800</u>	1 ~~9,500~~ <u>5,200</u>	NP NP

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most hospitals, nursing homes and mental health facilities that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group I-2 of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger hospitals, nursing homes and mental health facilities with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group I-2 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

I-2 Base Tabular Values Table 503		
	Type III	
	A	**B**
IBC 2003	S 1 A 12,000	NP NP
BOCA 1999	S 1 A 9,900	NP NP
SBC 1997	S 1 A 31,500**	NP NP
UBC 1997	S 1 A 6,800	NP NP

** = This number is increased to show sprinkler allowances
NP = Not Permitted
For accurate comparisons sprinkler increase allowances must be applied to IBC values

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group I-2 tabular values in Table 503 are the starting point for a design process that moves through many other steps, some of which are the subject of other code proposals. But, the Group I-2 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group I-2 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

13. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

14. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

15. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]

16. *In Group I-2 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the patients and staff that they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at any of the healthcare facilities nationwide.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often hospitals and other Group I2 occupancies. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In the event of significant fires in Group I-2 occupancies, large numbers of persons are likely to require rescues. Slightly over 5 percent of the United States' 65+ population – approximately 1.5 million persons[10] – occupy an estimated 16,032 nursing homes, congregate care and board and care homes.[11] In addition, more than 600,000 older Americans live in an estimated 28,000 assisted-living facilities.[12] Another 600,000 reside in hospices.[13] NFPA reports about 3,000 fires annually in these occupancies.[14] Many persons in this category are physically or mentally challenged and are unable to escape without assistance.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group I-2 occupancies may not be sufficient for extended outages. Emergency energy is not required for all health care facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group I-2 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[15] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[16] Recalled heads have been found in health care facilities. In fact, Veterans Affairs Medical Center officials reported the earliest recorded failures of the recalled heads in 1995. In spite of a significant effort to replace defective heads in Group I-2 occupancies, no one knows how many more recalled heads remain to be discovered in those health care facilities that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[17] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new hospital, nursing home and mental health facility constructed in compliance with the Group I-2 tabular values in Table 503 is an experiment in safety. I-2 occupancies now are being built at a record rate – increasingly to the fire protection measures permitted in the IBC's current Table 503. $100 billion in inflation-adjusted dollars have been spent in the past five years on new health care facilities, up 47 percent from the previous five years, according to the U.S. Census Bureau. Industry sources believe spending on I-2 construction was likely to reach a record $23.7 billion in 2005. Adoption in this cycle is critical.

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[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf
[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464,* American Society for Testing and Materials. pp 106-126.
[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf
[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm
[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf
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[15] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1
[16] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm
[17] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G106–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
I-4	S A	UL UL	~~5~~ 4 ~~60,500~~ 45,200	~~3~~ 2 ~~26,500~~ 20,200	~~2~~ 1 ~~13,000~~ 13,500	~~3~~ 2 ~~23,500~~ 20,200	~~2~~ 1 ~~13,000~~ 13,500	~~3~~ 2 ~~25,500~~ 20,200	~~1~~ 2 ~~18,500~~ 15,700	1 ~~9,000~~ 9,100

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most day care centers that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group I-4 of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger Group I-4 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group I-4 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

I-4 Base Tabular Values Table 503		
	Type III	
	A	**B**
IBC 2003	S 2 A 23,500	2 13,000
BOCA 1999	S N/A A	N/A
SBC 1997	S N/A A	N/A
UBC 1997	S N/A A	N/A
Proposed	S 2 A 20,200	1 13,500

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group I-4 tabular values in Table 503 are the starting point for a design process that moves through many other steps some of which are the subject of other code proposals. But, the Group I-4 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In Group I-4 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

17. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

18. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

19. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection." [5]

20. *In Group I-4 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the young children, older persons and staff that they hope to rescue increases exponentially.*

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at any of the nation's day care facilities.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: In the event of significant fires in Group I-4 occupancies, large numbers of persons are likely to require rescues. 150,000 older persons attend an estimated 3,500, registered adult day care centers.[10] Many persons in this category are physically or mentally challenged and may be unable to escape without assistance. In addition, almost 2 million children under the age of 5 years attend an estimated 113,000 licensed day care centers, and about 33.4 million children attend elementary schools.[11] Of those elementary school-aged children, about one-fifth attend day care centers before and after school.[12] On average, there are about 600 fires in day cares and preschools with one civilian death per year, and 1,400 fires annually in elementary schools.[13] Firefighters assume that all young children will require help in safely exiting a fire.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect.

Automatic sprinkler systems are certainly the first line of defense. Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group I-4 occupancies may not be sufficient for extended outages. Emergency energy is not required for all day care facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including I-4 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[14] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[15] In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in Group I-4 facilities that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads, which remain formally listed and, therefore, technically in compliance with the Model Codes.[16] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new Group I-4 occupancy constructed in compliance with the Group I-4 tabular values in Table 503 is an experiment in safety. Adoption in this cycle is critical.

Endnotes and Bibliography:

[1] LeBlanc, P. and Fahy, R. (June 2005). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464.* American Society for Testing and Materials. pp 106-126.

[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf

[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm

[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf

[6] "Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures" NIOSH Publication No. 2005-132, May 2005. Retrieved from: http://www.cdc.gov/niosh/docs/2005-132/#sum

[7] *Firefighters*. (2005, February 1). United States Fire Administration. Retrieved from: http://www.usfa.fema.gov/statistics/firefighters/

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[12] ibid.

[13] Rohr, K. (November 2004). *Structure Fires in Educational Properties*. National Fire Protection Association. Retrieved from: www.nfpa.org

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[15] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm

[16] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G107–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
R-1	S	UL	~~11~~ 12	4	~~4~~ 2	4	~~4~~ 2	4	3	2
	A	UL	~~UL~~ 29,900	~~24,000~~ 13,500	~~16,000~~ 9,100	~~24,000~~ 13,500	~~16,000~~ 9,100	~~20,500~~ 13,500	~~12,000~~ 10,500	~~7,000~~ 6,000

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most Group R-1occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group R-1of Table 503 to those in the 1997 Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: The IBC currently allows construction of taller, larger hotels and other transient residential occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group R-1 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

R-1 Base Tabular Values Table 503		
	Type III	
	A	B
IBC 2003	S 4 A 24,000	4 16,000
BOCA 1999	S 4 A 13,200	3 9,600
SBC 1997	S 5 A 36,000	5 24,000
UBC 1997	S 4 A 13,500	2 9,100

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group R-1 tabular values in Table 503 are the starting point for a design process that moves through many other steps some of which are the subject of other code proposals. But, the Group R-1 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 2: In hotels and other transient residential occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000°F and 1,200°F."*[2] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

2. *Fires generate very high temperatures in a matter of minutes.* The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[3] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[4]

3. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. “Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection.” [5]

4. In Group R-1 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel’s performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the guests and staff members that they hope to rescue increases exponentially.

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[6] NIOSH states, “Firefighters should be discouraged from risking their lives solely for property protection activities.” According to NIOSH, “Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses.”

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[7] 700,000 law enforcement officials[8] and almost 180,000 emergency medical technicians[9] must be prepared to initiate rescue operations in the event of a fire at any of the nation’s hotels and other transient residential occupancies.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often hotel and motel facilities. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 3: One would think that after the many serious hotel fires in the past 50 years, the problem would be solved. But one would be wrong. In mid January 2006, a fire at an unsprinklered Holiday Inn in Marietta, Georgia, left one person dead and 20 injured. The fire required more than 100 firefighters using ladder trucks to control the fire and initiate rescues – a level of response not possible in many communities.[10]

Justification 4: At the Marietta hotel fire, automatic fire sprinklers might have changed the outcome. But sprinklers are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group R-1 occupancies may not be sufficient for extended outages. Emergency energy is not required for all Group R-1facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group R-1 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
- *Sprinkler systems are shut off during maintenance and repair.* NFPA standards allow for the deactivation of sprinkler systems for several hours during maintenance and repair.[11] In the real world, repairs and maintenance may consume more than a typical workday, and systems often remain inactive well beyond the prescribed limit until work is complete.
- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[12] Recalled heads have been found in Group R-1 occupancies including many in Marriott properties renowned for high levels of fire protection. In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in hotels. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads which remain formally listed and therefore technically in compliance with the Model Codes.[13] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new hotel and other transient residential occupancy constructed in compliance with the Group R-1 tabular values in Table 503 is an experiment in safety. Adoption in this cycle is critical.

Endnotes and Bibliography:

[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf

[2] Bono, J.A. (1970). “New Criteria for Fire Endurance Tests.” *Fire Test Performance, ASTM STP 464*. American Society for Testing and Materials. pp 106-126.

[3] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf

[4] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm

[5] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf
[6] "Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures" NIOSH Publication No. 2005-132, May 2005. Retrieved from: http://www.cdc.gov/niosh/docs/2005-132/#sum
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[8] *Law Enforcement Statistics*. (2005, October 17). Bureau of Justice Statistics. Retrieved from: http://www.ojp.usdoj.gov/bjs/lawenf.htm.
[9] *Emergency Medical Technicians and Paramedics*. (2004). Bureau of Labor Statistics. Retrieved from: http://www.bls.gov/oco/ocos101.htm.
[10] Plummer, D. and Ridder, K. (2006, January 17). "Holiday Inn in Marietta, Ga. Temporarily Closes Following Fatal Fire; 30 Year Old Hotel Did Not Have Sprinklers." Atlanta Journal-Constitution and Tribune Business News. Retrieved from: http://www.hotel-online.com/News/PR2006_1st/Jan06_MariettaFire.html
[11] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.* (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1
[12] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm
[13] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G108–06/07
Table 503

Proponent: John C. Dean, the National Association of State Fire Marshals

Revise table as follows:

TABLE 503
ALLOWABLE HEIGHT AND BUILDING AREAS[a]
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building", per story

Group	Hgt(feet)	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hst(S)	UL	160	65	55	65	55	65	50	40
R-2[a]	S A	UL UL	~~11~~ 12 ~~UL~~ 29,900	4 ~~24,000~~ 13,500	~~4~~ 2 ~~16,000~~ 9,100	4 ~~24,000~~ 13,500	~~4~~ 2 ~~16,000~~ 9,100	4 ~~20,500~~ 13,500	3 ~~12,000~~ 10,500	2 ~~7,000~~ 6,000

(Portions of table not shown do not change)

Reason: A firefighter is more likely to die in a traffic accident on the way to a fire than crushed by a structural collapse caused by that fire.[1] This extraordinary building safety record is due in large part to the Legacy Codes' fire protection requirements, which governed the construction of most apartment buildings, fraternity and sorority houses and other Group R-2 occupancies that exist today. *In reducing and modifying those well-tested requirements, the International Building Code (IBC) proceeded from what we know to be safe to something unproven.*

Therefore, the National Association of State Fire Marshals (NASFM) respectfully requests the IBC to restore the tabular values in Group R-2 of Table 503 to those in the Uniform Building Code (UBC). We selected the UBC because it was the most widely adopted of the three Legacy Codes.

Justification 1: We have made enormous strides in reducing the loss of life and property in fires involving Group R-2 occupancies. But much is yet to be done. With hundreds of fire fatalities in Group R-2 occupancies each year, we should restore the Group R-2 tabular values in Table 503 as part of a broad strategy to further reduce the loss of life and property in Group R-2 occupancies. In 1992, firefighters responded to 472,000 residential fires. By 2001, the number had been reduced to 396,500 with just about one-quarter in multi-family dwellings. But 18.3 percent of the 1,049 residential fire deaths we saw in 2001 occurred in Group R-2 occupancies.[2] That remains an unacceptably high number of fatalities. We do not expect to save lives through building codes alone. We are now on the verge of effective, new fire safety requirements for the most flammable contents of Group R-2 occupancies, e.g., mattresses, upholstered furniture, consumer electronics, etc., and are making progress with automatic fire sprinklers. We believe that at a time when we are increasing fire safety across the board, it makes little sense to experiment with untested, lesser fire safety requirements contained in the IBC.

Justification 2: The IBC currently allows construction of taller, larger Group R-2 occupancies with greatly reduced levels of passive fire protection, and even larger buildings based on just active protection. The calculation begins with Table 503, which sets the base "maximum allowable area" by type of occupancy. Fire protection is defined subsequently. An architect may simply use the values in Table 503 to determine the size of a building. In Group R-2 occupancies, many of the "maximum allowable area" values in Table 503 are greater than what was allowed in any of the Legacy Codes. These values can be further increased by the use of height and area modifications.

At the Final Action Hearings in Detroit in October 2005, persons speaking against proposals similar to this one flatly stated that the tabular values in Table 503 are consistent with, and certainly no less restrictive than, comparable values in the Legacy Codes. To disprove that claim, we respectfully share this comparison.

R-2 Base Tabular Values Table 503		
	Type III	
	A	B
IBC 2003	S 4 A 24,000	4 16,000
BOCA 1999	S 4 **A 13,200**	3 9,600
SBC 1997	S 5 A 36,000	5 24,000
UBC 1997	S 4 A 13,500	2 9,100

We selected an example using Type III construction because it provides a fair and clear comparison of values. Because of differences among the Legacy Codes, other construction types are more difficult to compare with the IBC's Table 503.

NASFM membership includes both fire and building code enforcement officials who are well familiar with the ways these tables are used by those who are committed to public safety and those who are not. The Group R-2 tabular values in Table 503 are the starting point for a design process that moves through many other steps some of which are the subject of other code proposals. But, the Group R-2 tabular values in Table 503 start that process by allowing for the construction of larger buildings with considerably less fire protection than was required by similar requirements by the Legacy Codes. No building ever gets smaller than what is allowed by Table 503.

Justification 3: In Group R-2 occupancies constructed to the IBC's fire protection requirements, fire incident commanders are being asked to make an impossible choice: refuse to rescue persons unable to escape fires or ignore federal warnings of structural collapse and risk firefighters' lives. It comes down to four facts:

5. "Rapid deflection occurred and imminent collapse became apparent between 1,000 °F and 1,200°F."[3] Although published 35 years ago, J.A. Bono's research continues to be a valid description of how carbon steel structures perform in the high temperatures generated by fires.

6. Fires generate very high temperatures in a matter of minutes. The ASTM E119 fire curve is a well-accepted fire protection tool that requires tested materials to withstand 1,050°F at six minutes and 1,220°F at nine minutes. There are numerous full-scale test results that show how quickly the temperature rises following ignition. Most recently, the tests run by the National Institute of Standards and Technology (NIST) on The Station nightclub recreation showed peak temperatures between 1,100°F and 1,380°F in less than 1 1/2 minutes,[4] although these high temperatures were not sustained. In the experiments to simulate the World Trade Center fire spread over workstations, similar peak temperatures were sustained for over 30 minutes, but were not reached until 10 to 15 minutes into the test.[5]

7. *In ideal circumstances, the best trained and equipped fire departments arrive at fires approximately seven minutes after ignition of the fire. Most departments do not operate under ideal conditions.* In December 2002, the Federal Emergency Management Agency (FEMA), in cooperation with the National Fire Protection Association (NFPA), released a comprehensive study entitled *A Needs Assessment of the U.S. Fire Service*. Based on responses from more than 8,400 fire departments, the study found that an estimated 73,000 firefighters serve in communities that protect 50,000 people or more, yet have fewer than four career firefighters assigned to first-due engine companies. With that staffing level, the first arriving company cannot safely start an interior attack on a structure fire and must wait for additional responders.

In addition, about 45 percent of emergency responders on duty in a single shift lack portable radios and 36 percent lack self-contained breathing apparatus. About 57,000 firefighters do not have their own personal protective clothing.

More than a quarter million firefighters, mostly volunteers in rural communities, are involved in fighting structure fires but lack formal training to do so safely. Nearly three out of four communities have too few fire stations to meet the accepted ISO response-distance guidelines.

According to ISO, large numbers of fire departments provide only marginal or inadequate protection against structure fires. "Of almost 46,000 fire districts evaluated under the Public Protection Classification (PPC) program, some 14,000 (about 30 percent) have achieved only a Class 9 rating – the lowest recognized protection. More than 1,300 (or 3 percent) have the Class 10 rating – no recognized protection."[6]

8. In Group R-2 occupancies, those responders who arrive first must concentrate on rescue at the expense of suppression. As demonstrated in the discussion of steel's performance previously in this justification, every minute the fire is allowed to burn unchecked, the risk of structural collapse to firefighters and the residents they hope to rescue increases exponentially.

In a May 2005 alert from the National Institute for Occupational Safety and Health (NIOSH), firefighters are told not to risk their lives by entering a building if structural collapse is possible.[7] NIOSH states, "Firefighters should be discouraged from risking their lives solely for property protection activities." According to NIOSH, "Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses."

However, if there is any possibility that a burning building is occupied, emergency responders will go in to search for those occupants. At any time, more than one million firefighters,[8] 700,000 law enforcement officials[9] and almost 180,000 emergency medical technicians[10] must be prepared to initiate rescue operations in the event of a fire at apartment buildings, fraternity/sorority houses or other R-2 occupancies nationwide.

Additionally many firefighters may have no option but to enter these buildings from the ground level and make their way up through the interior of the building in their search for survivors, thus opening themselves up to the risk of structural collapse. In December 2002, the aforementioned FEMA needs assessment revealed that almost 900 communities, mostly with populations under 100,000, have buildings of four stories or more. In many of those communities, the tall buildings are often multifamily dwellings. Yet their fire departments often lack the ladder/aerial apparatus needed to approach the upper floors of a building from the outside.

Justification 4: Automatic fire sprinklers absolutely save lives and protect property, but they are far from perfect. *Automatic sprinkler systems are certainly the first line of defense.* Sprinkler systems have proven their value countless times. However, failure to properly maintain systems creates problems, as with any fire protection equipment or system. Loss of municipal water pressure, unapproved remodeling, unapproved change of hazard or occupancy, and other unapproved changes that often go undetected for months or even years could result in reduced effectiveness or even an ineffective sprinkler system. What makes sprinklers so valuable is that they often perform exceptionally well even when not properly maintained. In larger buildings, because of height and/or area, the risk is too great to eliminate or reduce other systems and still be able to adequately conduct rescue and suppression operations. However, increasingly over the years other built-in fire protection is being reduced or eliminated in sprinklered buildings. While some of the reductions or eliminations are justified, many were made without much thought, such as we have seen with the merging of the three legacy codes. Eliminating or reducing backup or redundant fire protection in many larger buildings can create unsafe conditions for both occupants and first responders.

- *Power outages and interrupted water service interfere with active protection.* In the case of multi-story buildings or where water pressure is inadequate, fire sprinklers commonly rely on pumps to ensure adequate water, and pumps require electricity either as their primary source of energy or to operate the electronic control modules that regulate most fuel-powered units. Without electricity, sprinklers above the first few levels of a building may not function. Emergency back-up electricity where required for Group R-2 occupancies but may not be sufficient for extended outages. Emergency energy is not required for all Group R-2 facilities. According to the Edison Electric Institute, 67 percent of all power outages are weather-related. Most power outages last a few hours. But when hurricanes hit the Southeast, ice storms cripple New England and the Midwest, and tornados and earthquakes devastate the West, power outages may extend to days and even weeks. For example, Hurricane Katrina disrupted electric service for more than 300,000 customers, including Group R-2 occupancies, for up to eight days in Birmingham and Tuscaloosa, Alabama – cities more than 150 miles inland.
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- *The challenge of replacing recalled sprinkler heads.* More than four years after the government announced the recall of 35 million defective fire sprinkler heads, nearly two-thirds remain in use, millions more have been recalled and a leading sprinkler head manufacturer reports that some claims of property loss have been made related to fires in buildings found to contain the recalled heads.[12] Recalled heads have been found in Group R-2 occupancies. In spite of a significant effort to replace defective heads in all occupancies, no one knows how many more recalled heads remain to be discovered in those Group R-2 occupancies that are sprinklered. In many jurisdictions, fire code officials lack the authority to require the replacement of recalled sprinkler heads which remain formally listed and therefore technically in compliance with the Model Codes.[13] Sprinkler manufacturers say they lack information on where the heads were installed, and installers expect reimbursement for labor to replace defective units.

Justification 5: Every new apartment building, fraternity and sorority house and other Group R-2 occupancy constructed in compliance with the Group R-2 tabular values in Table 503 is an experiment in safety. Hundreds of thousands of Group R-2 occupancies are being constructed to the IBC. According to federal sources, in January 2006 alone:

- 428,000 permits were granted for residential units in buildings with five or more units.
- Construction began on 427,000 units.
- 327,000 residential units in buildings with five or more units were completed.[14]

Adoption in this cycle is critical.

[1] LeBlanc, P. and Fahy, R. (2005, June). *Firefighter Fatalities in the United States – 2004.* National Fire Protection Association. Retrieved from: http://www.nfpa.org/assets/files/PDF/osfff.pdf
[2] *Fires in the United States: 1992-2001.* United States Fire Administration. Retrieved from: http://www.usfa.fema.gov/downloads/pdf/publications/fius13/ch3.pdf
[3] Bono, J.A. (1970). "New Criteria for Fire Endurance Tests." *Fire Test Performance, ASTM STP 464.* American Society for Testing and Materials. pp 106-126.
[4] *Report of the Technical Investigation of The Station Nightclub Fire*, June 2005. NIST NCSTAR 2, pp 4-36. Retrieved from: http://fire.nist.gov/bfrlpubs/fire05/PDF/f05032.pdf
[5] *Reconstruction of the Fires in the World Trade Center Towers.* NIST NCSTAR 1-5, p 78. Retrieved from: http://wtc.nist.gov/oct05NCSTAR1-5index.htm
[6] *Effective Fire Protection: A National Concern*. (2004). ISO. Retrieved from: http://www.iso.com/studies_analyses/fireProtection/docs/FireProtectionBrochure.pdf
[7] "Preventing Injuries and Deaths of Fire Fighters Due to Truss System Failures" NIOSH Publication No. 2005-132, May 2005. Retrieved from: http://www.cdc.gov/niosh/docs/2005-132/#sum
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[11] *NFPA 25: Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.* (2002). National Fire Protection Association. Retrieved from: http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=25&cookie%5Ftest=1
[12] Eisler, P. (2006, February 13). "Defective Sprinklers Still in Use." *USA Today*, p. 1. Retrieved from: http://www.usatoday.com/news/nation/2006-02-12-defective-sprinklers_x.htm
[13] The 2006 International Fire Code was amended to provide Authorities Having Jurisdiction (AHJs) with the authority to compel replacement of fire protection technologies subject to voluntary or mandatory recalls. Underwriters Laboratories declined to remove the listing for the federally recalled sprinkler heads, but has modified its performance standards leading to listing.
[14] *New Residential Construction in January 2006.* (2006, February 16). US Census Bureau Joint Press Release with US Department of Housing and Urban Development. Retrieved from: http://www.census.gov/indicator/www/newresconst.pdf

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

G109–06/07
503.1

Proponent: Sarah A. Rice, Schirmer Engineering Corporation

Revise as follows:

503.1 General. The height and area for buildings of different construction types shall be governed by the intended use of the building and shall not exceed the limits in Table 503 except as modified in Sections 503.1.1 through 503.1.3, Sections 504 through 509 and Chapter 4 ~~hereafter~~. Each part of a building included within the exterior walls or the exterior walls and fire walls where provided shall be permitted to be a separate building.