G7-06/07, Part I
403.12.1, 707.14.1, 3002.3 (New), 3006.4

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

PART I – IBC GENERAL

1. Revise as follows:

403.12.1 Stairway communications system. The following stairway communication and monitoring systems shall be installed at every fifth floor of each required stairway and connected to an approved constantly attended station:

1. ~~A~~ Telephone or other two-way communications ~~system connected to an approved constantly attended station shall be provided at not less than every fifth floor in each required stairway where the doors to the stairway are locked.~~
2. Video cameras.

2. Add new text as follows:

3002.3 Elevator hoistway monitoring. In buildings with an occupied floor more than 75 feet above the lowest level of fire department vehicle access, the elevator hoistway shall be provided with a video camera at the top of each elevator hoistway. Light shall be provided for cameras that are not capable of recording without light.

3. Revise as follows:

3006.4 Machine rooms and machinery spaces. Elevator machine rooms and machinery spaces shall be enclosed with fire barriers complying with Section 706 or horizontal assemblies complying with Section 711 having a fire-resistance rating not less than the required rating of the hoistway enclosure served by the machinery. Openings shall be protected with assemblies having fire-protection rating not less than that required for the hoistway enclosure doors. In buildings with an occupied floor more than 75 feet above the lowest level of fire department vehicle access, the machine room shall be provided with smoke detectors, temperature sensors and video cameras. Light shall be provided for cameras that are not capable of recording without light. In addition, cameras shall be positioned so that the entire machine room can be viewed.

707.14.1 Elevator lobby. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three stories. The lobby shall separate the elevator shaft enclosure doors from each floor by fire partitions equal to the fire-resistance rating of the corridor and the required opening protection. Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code. In buildings with an occupied floor more than 75 feet above the lowest level of fire department vehicle access, the elevator lobby shall be provided with video camera coverage.

Exceptions:

1. Enclosed elevator lobbies are not required at the street floor, provided the entire street floor is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Elevators not required to be located in a shaft in accordance with Section 707.2 are not required to have enclosed elevator lobbies.
3. Where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall be tested in accordance with UL 1784 without an artificial bottom seal.
4. In other than Group I-3, and buildings having occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, enclosed elevator lobbies are not required where the building is protected by an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.

5. Smoke partitions shall be permitted in lieu of fire partitions to separate the elevator lobby at each floor where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
6. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 707.14.2.

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this change is to increase the ability of firefighters, and other emergency responders, to develop a clear picture of conditions throughout the building which will enable them to better manage evacuation, fire suppression and other emergency response activities. The purpose is also to enhance the safety of emergency responders by enabling them to maintain better situational awareness.

The National Institute of Standards and Technology's (NIST) report on the World Trade Center (WTC) tragedy amply documented the tactical and informational difficulties experienced by emergency responders and occupants during the WTC event. Similar difficulties occur in much smaller events and they place lives at risk.

The Code already requires many systems which enhance emergency responder and occupant awareness. Their use can be improved and they can be further supplemented. Recommendations 13, 14, and 15 of the WTC Report outline a number of valuable measures which are reasonable and practical. To the extent appropriate, this proposal seeks to incorporate those provisions into the Code.

This proposal seeks to improve responder awareness of conditions in the building to assist in management of an incident, improve the existing fire command center to enhance its value, require the off-site transmission of the key data available in the center, require redundancy of key emergency circuits and improve the robustness and the location of the center.

Awareness is improved by requiring control center monitoring of:

1. Video cameras in stairway shafts, elevator lobbies, elevator hoistways, and elevator machine rooms as well as any other video in the building,
2. Remote controls and status indicators for the looped and valved redundant sprinkler risers required by the proponents' recommended new Section 403.2.1, and
3. Status indicators for all smoke detectors and temperature sensors

The value of the fire control center already required by the Code is enhanced by the additional monitoring made possible, and a strengthened "Emergency Resource Manual" which will now include operating instructions for emergency systems as well as information on the emergency aspects of HVAC systems, elevator controls, communication systems and utilities. The center is retitled the emergency command center to reflect its role in managing emergencies other than fire emergencies.

New language at the end of amended Section 911.1 requires the ability to transmit the information available in the center to off-site fire command facilities including mobile facilities.

A new Section 911.2 improves the robustness of the fire command center by requiring that it be designed to the same 2 psi over-pressure requirement as the proponents have proposed for exit stairway enclosures and have a 2-hour rating. New language at the end of amended Section 911.1 requires redundancy of circuits serving to connect the command center with key sensors or controls.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

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

Committee Action: Disapproved

Committee Reason: This proposal which was intended to provide fire fighters with a tool to better assess conditions throughout the building was disapproved with concerns related to the amount of information generated by the video monitoring and how it would be managed within a large building.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings requests Approval as Modified by this public comment for Part I.

Modify proposal as follows:

3002.3 Elevator hoistway monitoring. In buildings with an occupied floor more than 75 feet above the lowest level of fire department vehicle access, the elevator hoistway shall be provided with a video camera at the top of each elevator hoistway mounted to look down the hoistway in the direction of the top of the elevator cab. Light shall be provided for cameras that are not capable of recording without light oriented along the viewing area of the camera, and a reflective material shall be mounted to the top of the elevator cab such that the reflection will be observable by the monitoring camera at the lowest stop of the elevator cab. The reflector shall be no less than two inches (5.1cm) by 12 inches (30.5 cm).

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The committee's reason for disapproval of this change was a concern related to the amount of information generated by the video monitoring and how it would be managed within a large building or "information overload". Several opponents questioned the ability of the staff in the fire command center to observe all of the required video feeds at once. At the time, the proponents did not have an opportunity to respond to this concern. There is commercial off-the-shelf "intelligent software" that is available such that the staff of the fire command center need not observe all of these feeds; the software is "event driven" and will select information that is pertinent and display just this information. This software is currently available off-the-shelf from companies such as Johnson Control and Honeywell. The Port Authority of New York and New Jersey is currently installing a system to monitor the perimeter of the Newark airport by the use of ***ONE*** video screen. Clearly the perimeter of this airport is substantially larger than the portions of the building that are required to be monitored as a result of this code change. By requiring these video feeds, the situational awareness of the staff in the fire command center is substantially increased. While researching the availability of this software, I was informed by Mr. Alan Reiss the building manager of the World Trade Center, that he was unaware of the magnitude of the event on September 11, 2001. In fact, he commented that the people at home watching the television had a better situational awareness than he did because of the lack of information available at the fire command center. This has to be changed and this proposal will change it.

Additionally, several opponents questioned the intent of the elevator hoistway monitoring in Section 3002.3. This public comment clarifies that the hoistway monitoring is intended to monitor the status of the elevator cab within the hoistway.

Final Action: AS AM AMPC _______ D

G7-06/07, Part II
IFC 509 (IBC [F] 911)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

PART II - IFC

Revise as follows:

509.1 Features. Where required by other sections of this code and all buildings classified as high-rise buildings by the *International Building Code*, ~~a fire~~ an emergency command center for ~~fire department~~ emergency operations shall be provided. The location and accessibility of the ~~fire~~ emergency command center shall be approved by the fire department. The ~~fire~~ emergency 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 of the *International Building Code* or horizontal assembly constructed in accordance with Section 711 of the *International Building Code*, or both, except for buildings more than 420 feet (128 m) in height as provided for in Section 509.3. 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 emergency ~~fire~~ command center shall comply with NFPA 72 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 annunciate or 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. Building emergency resource manual approved by the fire department that includes emergency operation instructions and ~~Schematic~~ building plans indicating the typical floor plan and detailing the building core, means of egress, as well as the layout and operating instructions for the emergency aspects of fire protection systems, HVAC systems, elevator controls, communication systems, utilities, fire-fighting equipment and fire department access.
13. Worktable.
14. Generator supervision devices, manual start and transfer features.

15. Public address system, where specifically required by other sections of this code.
16. <u>Video monitoring for video cameras required by the *International Building Code* and any others used to monitor conditions or activities in the building.</u>
17. <u>Status indication of smoke detectors, temperature sensors, and video cameras for elevator machine rooms.</u>
18. <u>Controls and valve status indicators for remote control valves on sprinkler/standpipe vertical risers.</u>

<u>In buildings that are more than 420 feet (128 m) in height, systems and equipment for features 1, 2, 3, 4, 7, 15, and 18 shall be provided with redundant circuitry during normal and emergency operating modes and shall have the ability to transmit and communicate off-site including mobile access if required by the Fire Department.</u>

<u>**509.2 Location.** An emergency command center shall be located remote from uncontrolled building entrances and loading docks, shall not be visible from the street, and shall be at a location approved by the Fire Department and other emergency management agencies having jurisdiction.</u>

<u>**509.3 Buildings more than 420 feet in height**. In buildings that are more than 420 feet (128 m) in height, the emergency command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 706 of the *International Building Code* or 2-hour horizontal assembly constructed in accordance with Section 711 of the *International Building Code,* or both. The enclosure wall surfaces from the top of the floor to the underside of the floor above and connections to supporting members shall be capable of resisting a uniform pressure of not less than 2 pounds per square inch (psi) applied perpendicular to the exterior face of the enclosure.</u>

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this change is to increase the ability of firefighters, and other emergency responders, to develop a clear picture of conditions throughout the building which will enable them to better manage evacuation, fire suppression and other emergency response activities. The purpose is also to enhance the safety of emergency responders by enabling them to maintain better situational awareness.

The National Institute of Standards and Technology's (NIST) report on the World Trade Center (WTC) tragedy amply documented the tactical and informational difficulties experienced by emergency responders and occupants during the WTC event. Similar difficulties occur in much smaller events and they place lives at risk.

The Code already requires many systems which enhance emergency responder and occupant awareness. Their use can be improved and they can be further supplemented. Recommendations 13, 14, and 15 of the WTC Report outline a number of valuable measures which are reasonable and practical. To the extent appropriate, this proposal seeks to incorporate those provisions into the Code.

This proposal seeks to improve responder awareness of conditions in the building to assist in management of an incident, improve the existing fire command center to enhance its value, require the off-site transmission of the key data available in the center, require redundancy of key emergency circuits and improve the robustness and the location of the center.

Awareness is improved by requiring control center monitoring of:

1. Video cameras in stairway shafts, elevator lobbies, elevator hoistways, and elevator machine rooms as well as any other video in the building,
2. Remote controls and status indicators for the looped and valved redundant sprinkler risers required by the proponents' recommended new Section 403.2.1, and
3. Status indicators for all smoke detectors and temperature sensors

The value of the fire control center already required by the Code is enhanced by the additional monitoring made possible, and a strengthened "Emergency Resource Manual" which will now include operating instructions for emergency systems as well as information on the emergency aspects of HVAC systems, elevator controls, communication systems and utilities. The center is retitled the emergency command center to reflect its role in managing emergencies other than fire emergencies.

New language at the end of amended Section 911.1 requires the ability to transmit the information available in the center to off-site fire command facilities including mobile facilities.

A new Section 911.2 improves the robustness of the fire command center by requiring that it be designed to the same 2 psi over-pressure requirement as the proponents have proposed for exit stairway enclosures and have a 2-hour rating. New language at the end of amended Section 911.1 requires redundancy of circuits serving to connect the command center with key sensors or controls.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

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

Analysis: In this proposal for IFC Section 509.1, the referenced Section 911.3 is a new section that is being proposed in a separate change by the Committee on Terrorism Resistant Buildings that is being heard by the Fire Code Development Committee.

Committee Action: Disapproved

Committee Reason: The proposal is a good initial attempt to increase the information and improve the facilities provided to the fire department for dealing with incidents in high-rise and super-high-rise buildings, however it is in need of further work. The location and construction requirements proposed would be onerous in an existing building and their applicability should be specifically limited to new construction only. Including the fire department as a requiring- or approving-agency is inconsistent with code style. The defined term "fire chief" should be used instead. The use of video surveillance has become a contentious privacy issue and including provisions for monitoring of video cameras in the control center in Section 509.1, Item 16 could be problematic. It is unclear what the term "temperature sensor" means in Section 509.1, Item 17 or what an "uncontrolled building entrance" is in proposed Section 509.2.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings requests Approval as Modified by this public comment for Part II.

Modify proposal as follows:

509.1 Features. Where required by other sections of this code and all buildings classified as high-rise buildings by the *International Building Code*, an emergency command center for emergency operations shall be provided. The location and accessibility of the fire emergency command center shall be approved by the fire department. The emergency 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 of the *International Building Code* or horizontal assembly constructed in accordance with Section 711 of the *International Building Code*, or both~~, except for buildings more than 420 feet (128 m) in height as provided for in Section 509.3.~~ The room shall be a minimum of 96 square feet (9 m2) with a minimum dimension of 8 feet (2438 mm). A layout of the ~~fire~~ emergency command center and all features required by the section to be contained therein shall be submitted for approval prior to installation. The emergency command center shall comply with NFPA 72 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 annunciate or 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. Building emergency resource manual approved by the fire department that includes emergency operation instructions and Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, as well as the layout and operating instructions for the emergency aspects of fire protection systems, HVAC systems, elevator controls, communication systems, utilities, fire-fighting equipment and fire department access.
13. Worktable.
14. Generator supervision devices, manual start and transfer features.
15. Public address system, where specifically required by other sections of this code.
~~16. Video monitoring for video cameras required by the *International Building Code* and any others used to monitor conditions or activities in the building.~~
~~17. Status indication of smoke detectors, temperature sensors, and video cameras for elevator machine rooms.~~
~~18.~~ 16. Controls and valve status indicators for remote control valves on sprinkler/standpipe vertical risers.

In buildings that are more than 420 feet (128 m) in height, systems and equipment for features 1, 2, 3, 4, 7, 15, and ~~18~~ 16 shall be provided with redundant circuitry during normal and emergency operating modes and shall have the ability to transmit and communicate off-site including mobile access if required by the Fire Department.

~~**509.2 Location.** An emergency command center shall be located remote from uncontrolled building entrances and loading docks, shall not be visible from the street, and shall be at a location approved by the Fire Department and other emergency management agencies having jurisdiction~~

~~**509.3 Buildings more than 420 feet in height**. In buildings that are more than 420 feet (128 m) in height, the emergency command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 706 of the *International Building Code* or 2-hour horizontal assembly constructed in accordance with Section 711 of the *International Building Code,* or both. The enclosure wall surfaces from the top of the floor to the underside of the floor above and connections to supporting members shall be capable of resisting a uniform pressure of not less than 2 pounds per square inch (psi) applied perpendicular to the exterior face of the enclosure.~~

509.2 Video monitoring. In buildings provided with video monitoring, the video signal shall be provided within the Fire Command Center.

Commenter's reason: This public comment removes the requirements contained in the original code change proposal with reference to the location and hardening of the emergency command center. This public comment would also now require that, when a building is provided with a video monitoring system for any reason, the signal from the monitoring system be sent to the emergency command center instead of establishing requirements for a video monitoring system. This will increase the "situational awareness" of the staff in the emergency command center as well as the fire department in an emergency situation.

Public Comment 2:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings requests Approval as Modified by this public comment.

Modify proposal as follows:

509.1 Features. Where required by other sections of this code and all buildings classified as high-rise buildings by the *International Building Code*, an emergency command center for emergency operations shall be provided. The location and accessibility of the emergency command center shall be approved by the ~~fire department~~ Fire Chief. The emergency 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 of the *International Building Code* or horizontal assembly constructed in accordance with Section 711 of the *International Building Code*, or both, except for buildings more than 420 feet (128 m) in height as provided for in Section 509.3. 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~~ emergency command center and all features required by the section to be contained therein shall be submitted for approval prior to installation. The emergency command center shall comply with NFPA 72 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 annunciate or 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. Building emergency resource manual approved by the fire department that includes emergency operation instructions and building plans indicating the typical floor plan and detailing the building core, means of egress, as well as the layout and operating instructions for the emergency aspects of fire protection systems, HVAC systems, elevator controls, communication systems, utilities, fire-fighting equipment and fire department access.
13. Worktable.
14. Generator supervision devices, manual start and transfer features.
15. Public address system, where specifically required by other sections of this code.
16. Video monitoring for video cameras required by the *International Building Code* and any others used to monitor conditions or activities in the building.
17. Status indication of smoke detectors, temperature sensors, and video cameras for elevator machine rooms.
18. Controls and valve status indicators for remote control valves on sprinkler/standpipe vertical risers.

In buildings that are more than 420 feet (128 m) in height, systems and equipment for features 1, 2, 3, 4, 7, 15, and 18 shall be provided with redundant circuitry during normal and emergency operating modes and shall have the ability to transmit and communicate off-site including mobile access if required by the Fire Department.

509.2 Location. In new buildings, the ~~An~~ emergency command center shall be located ~~remote~~ at least 25 feet from uncontrolled building entrances and loading docks, shall not be visible from the street, and shall be at a location approved by the ~~Fire Department and other emergency management agencies having jurisdiction~~ Fire Chief.

509.3 Buildings more than 420 feet in height. In new buildings that are more than 420 feet (128 m) in height, the emergency command center shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 706 of the *International Building Code* or 2-hour horizontal assembly constructed in accordance with Section 711 of the *International Building Code,* or both. ~~The enclosure wall surfaces from the top of the floor to the underside of the floor above and connections to supporting members shall be capable of resisting a uniform pressure of not less than 2 pounds per square inch (psi) applied perpendicular to the exterior face of the enclosure.~~

Commenter's reason: The committee was concerned with the use of the term "Fire Department" in sections 509.1 and 509.2; this public comment amends this term to "Fire Chief" for consistency with the IFC. Opponents of this change felt that the requirement in 509.2 for the enclosure wall to withstand the 2 psi pressure was unjustified. This public comment removes that requirement. Opponents were also opposed to the requirement for the 2 hour fire resistance rating. This public comment does not change this requirement. Understanding what the Emergency Command Center contains and is used for, the wall surrounding this space should be provided with at least the equivalent protection of the exit enclosures of the building. There was also a question regarding the intent of the word "remote" in section 509.2. Whereas the proponents of this change believe the intent of the term is clear, this public comment specifies a minimum of 25 feet by which the command center be separated from uncontrolled building entrances and loading docks. In a building the size at which an emergency command center is required, a 25 feet separation is not an onerous distance. The committee was also concerned with the location and construction requirements in 509.2 and 509.3 being applied to existing command centers. This public comment adds text such that these requirements are applicable to new construction only.

Final Action: AS AM AMPC _______ D

G8-06/07

[F] 415.6.2.1.1, 505.4, 506.1.1, 507.2, 507.3, 507.4, 507.6, 507.7, 507.8, 507.9, 507.10, 509.3, 509.8, [F] 903.2.8.1 (IFC 903.2.8.1), [F] 903.2.10.1 (IFC 903.2.10), 1009.11 (IFC [B] 1009.11), 1020.1 (IFC [B] 1020.1), 502.1, 202

Proposed Change as Submitted:

Proponent: Maureen Traxler, City of Seattle, WA, Department of Planning and Development

Revise as follows:

[F] 415.6.2.1.1 Height exception. Where storage tanks are located within only a ~~single-story~~ building no more than one story in height, the height limitation of Section 503 shall not apply for Group H.

505.4 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.

506.1.1 Basements. A single basement ~~that is not a story above grade plane~~ need not be included in the total allowable area, provided such basement does not exceed the area permitted for a building with no more than one story above grade plane.

507.2 Nonsprinklered, one story. The area of a Group F-2 or S-2 building no more than one-story in height, ~~Group F-2 or S-2 building~~ shall not be limited when the building is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.3 Sprinklered, one story. The area of a Group B, F, M or S building no more than one-story in height~~,~~ ~~Group B, F, M or S building~~ or a Group A-4 building no more than one-story in height ~~Group A-4 building,~~ of other than Type V construction, shall not be limited when the building is provided with an automatic sprinkler system throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

Exceptions:

1. Buildings and structures of Type I and II construction for rack storage facilities that do not have access by the public shall not be limited in height, provided that such buildings conform to the requirements of Sections 507.2 and 903.3.1.1 and NFPA 230.
2. The automatic sprinkler system shall not be required in areas occupied for indoor participant sports, such as tennis, skating, swimming and equestrian activities in occupancies in Group A-4, provided that:
   2.1. Exit doors directly to the outside are provided for occupants of the participant sports areas; and
   2.2. The building is equipped with a fire alarm system with manual fire alarm boxes installed in accordance with Section 907.

3. Group A-1 and A-2 occupancies of other than Type V construction shall be permitted, provided:
    3.1. All assembly occupancies are separated from other spaces as required for separated uses in Section 508.3.3.4 with no reduction allowed in the fire-resistance rating of the separation based upon the installation of an automatic sprinkler system;
    3.2. Each Group A occupancy shall not exceed the maximum allowable area permitted in Section 503.1; and
    3.3. All required exits shall discharge directly to the exterior.

507.4 Two story. The area of a Group B, F, M or S building no more than two stories in height ~~two-story, Group B, F, M or S building~~ shall not be limited when the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.6 Group A-3 buildings. The area of a Group A-3 building no more than one-story in height~~, Group A-3 building~~ used as a place of religious worship, community hall, dance hall, exhibition hall, gymnasium, lecture hall, indoor swimming pool or tennis court of Type II construction shall not be limited when all of the following criteria are met:

1. The building shall not have a stage other than a platform.
2. The building shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
3. The assembly floor shall be located at or within 21 inches (533 mm) of street or grade level and all exits are provided with ramps complying with Section 1010.1 to the street or grade level.
4. The building shall be surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.7 Group H occupancies. Group H-2, H-3 and H-4 occupancies shall be permitted in unlimited area buildings containing Group F and S occupancies, in accordance with Sections 507.3 and 507.4 and the limitations of this section. The aggregate floor area of the Group H occupancies located at the perimeter of the unlimited area building shall not exceed 10 percent of the area of the building nor the area limitations for the Group H occupancies as specified in Table 503 as modified by Section 506.2, based upon the percentage of the perimeter of each Group H fire area that fronts on a street or other unoccupied space. The aggregate floor area of Group H occupancies not located at the perimeter of the building shall not exceed 25 percent of the area limitations for the Group H occupancies as specified in Table 503. Group H fire areas shall be separated from the rest of the unlimited area building and from each other in accordance with Table 508.3.3 For two-story unlimited area buildings, the Group H fire areas shall not be located ~~above the first~~ more than one story above grade plane unless permitted by the allowable height in stories and feet as set forth in Table 503 based on the type of construction of the unlimited area building.

507.8 Aircraft paint hangar. The area of a Group H-2 aircraft paint hangar no more than one-story in height, ~~Group H-2 aircraft paint hangar~~ shall not be limited where such aircraft paint hangar complies with the provisions of Section 412.4 and is entirely surrounded by public ways or yards not less in width than one and one-half times the height of the building.

507.9 Group E buildings. The area of a Group E building no more than one-story in height, ~~Group E building~~ of Type II, IIIA or IV construction shall not be limited when the following criteria are met:

1. Each classroom shall have not less than two means of egress, with one of the means of egress being a direct exit to the outside of the building complying with Section 1018.
2. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
3. The building is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.10 Motion picture theaters. In buildings of Type II construction, the area of a ~~one-story~~ motion picture theater located on the first story above grade plane shall not be limited when the building is provided with an automatic sprinkler system throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

509.3 Group S-2 enclosed parking garage with Group S-2 open parking garage above. A Group S-2 enclosed parking garage located ~~in the basement or first~~ no more than one story above grade plane, and located below a Group S-2 open parking garage shall be classified as a separate and distinct building for the purpose of determining the type of construction when the following conditions are met:

1. The allowable area of the structure shall be such that the sum of the ratios of the actual area divided by the allowable area for each separate occupancy shall not exceed 1.0.
2. The Group S-2 enclosed parking garage is of Type I or II construction and is at least equal to the fire-resistance requirements of the Group S-2 open parking garage.
3. The height and the number of the floors above the basement shall be limited as specified in Table 406.3.5.
4. The floor assembly separating the Group S-2 enclosed parking garage and Group S-2 open parking garage shall be protected as required for the floor assembly of the Group S-2 enclosed parking garage. Openings between the Group S-2 enclosed parking garage and Group S-2 open parking garage, except exit openings, shall not be required to be protected.
5. The Group S-2 enclosed parking garage is used exclusively for the parking or storage of private motor vehicles, but shall be permitted to contain an office, waiting room and toilet room having a total area of not more than 1,000 square feet (93 m^2), and mechanical equipment rooms incidental to the operation of the building.

509.8 Group B or M with Group S-2 open parking garage above. Group B or M uses located in the basement or first story above grade plane below a Group S-2 open parking garage shall be classified as a separate and distinct building for the purpose of determining the type of construction when all of the following conditions are met:

1. The basement or first story above grade plane shall be Type I or II construction, but not less than the type of construction required for the open parking garage above. The height and area of the basement or first story shall not exceed the limitations in Section 503 for the Group B or M uses.
2. The height and area of the open parking garage shall not exceed the limitations permitted under Section 406.3. The height, in both feet and stories, of the open parking garage shall be measured from grade plane and include both the open parking garage and the basement or first story above grade plane.
3. Fire separation assemblies between the open parking garage and the basement or first story above grade plane ~~use group~~ occupancy shall correspond to the required fire-resistance rating prescribed by Table 508.3.3
4. Exits serving the open parking garage shall discharge directly to a street or public way and shall be separated from the basement or first story above grade plane ~~use group~~ occupancy by not less than 2-hour fire barriers constructed in accordance with Section 706 or 2-hour horizontal assemblies constructed in accordance with Section 711, or both, with opening protectives in accordance with Table 715.4.

[F] 903.2.8.1 Repair garages. An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406, as shown:

1. Buildings having two or more stories ~~in height~~, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m^2).
2. ~~One-story buildings~~ Buildings no more than one story in height, with a fire area containing a repair garage exceeding 12,000 square feet (1115 m^2).
3. Buildings with a repair garage servicing vehicles parked in the basement.

[F] 903.2.10.1 Stories ~~and basements~~ without openings. An automatic sprinkler system shall be installed throughout all stories, including basements, ~~every story or basement~~ of all buildings where the floor area exceeds 1,500 square feet (139.4m^2) and where there is not provided at least one of the following types of exterior wall openings:

1. Openings below grade that lead directly to ground level by an exterior stairway complying with Section 1009 or an outside ramp complying with Section 1010. Openings shall be located in each 50 linear feet (15 240 mm), or fraction thereof, of exterior wall in the story on at least one side.
2. Openings entirely above the adjoining ground level totaling at least 20 square feet (1.86 m^2) in each 50 linear feet (15 240 mm), or fraction thereof, of exterior wall in the story on at least one side.

1009.11 Stairway to roof. In buildings ~~located~~ four or more stories in height ~~above grade plane~~, one stairway shall extend to the roof surface, unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope). In buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an alternating tread device.

1020.1 Enclosures required. Interior exit stairways and interior exit ramps shall be enclosed with fire barriers constructed in accordance with Section 706 or horizontal assemblies constructed in accordance with Section 711, or both. Exit enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the exit enclosure shall include any basements but not any mezzanines. An exit enclosure shall not be used for any purpose other than means of egress.

Exceptions:

1. In all occupancies, other than Group H and I occupancies, a stairway is not required to be enclosed when the stairway serves an occupant load of less than 10 and the stairway complies with either Item 1.1 or 1.2.
   In all cases, the maximum number of connecting open stories shall not exceed two.
   1.1. The stairway is open to not more than one story above the story at the level of exit discharge; or
   1.2. The stairway is open to not more than one story below the story at the level of exit discharge.
2. Exits in buildings of Group A-5 where all portions of the means of egress are essentially open to the outside need not be enclosed.
3. Stairways serving and contained within a single residential dwelling unit or sleeping unit in Group R-1, R-2 or R-3 occupancies are not required to be enclosed.
4. Stairways that are not a required means of egress element are not required to be enclosed where such stairways comply with Section 707.2.
5. Stairways in open parking structures that serve only the parking structure are not required to be enclosed.
6. Stairways in Group I-3 occupancies, as provided for in Section 408.3.6, are not required to be enclosed.
7. Means of egress stairways as required by Section 410.5.3 are not required to be enclosed.
8. In other than Group H and I occupancies, a maximum of 50 percent of egress stairways serving one adjacent floor are not required to be enclosed, provided at least two means of egress are provided from both floors served by the unenclosed stairways. Any two such interconnected floors shall not be open to other floors. Unenclosed exit stairways shall be remotely located as required in Section 1015.2.
9. In other than Group H and I occupancies, interior egress stairways serving only the first and second stories <u>above grade plane</u> of a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 are not required to be enclosed, provided at least two means of egress are provided from both floors served by the unenclosed stairways. Such interconnected stories shall not be open to other stories. Unenclosed exit stairways shall be remotely located as required in Section 1015.2.

502.1 Definitions.

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 that is not a story above grade plane <u>(See "Story above grade plane" in Section 202)</u> ~~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.~~

SECTION 202
DEFINITIONS

STORY. That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above (also see <u>"Basement",</u> "Mezzanine" and Section 502.1). It is measured as the vertical distance from top to top of two successive tiers of beams or 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.

STORY ABOVE GRADE PLANE. Any story having its finished floor surface entirely above grade plane, ~~except that a basement shall be considered as a story above grade plane~~ <u>or in which</u> ~~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.

Reason: The purpose of this proposal is to clarify the use of the term "basement" in the IBC.

Part 1 of the proposal makes several corrections to the use of terms.

It clarifies what is meant when the code uses "one-story building", "two-story building", "first story", and similar phrases. "Story" is defined as "That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above". According to this definition, basements are stories. This proposal revises several code sections to clarify that, when the codes uses 'buildings with one (or two) stories in height", or similar term, only stories above grade plane are counted. According to the current code language, a building with one basement and one story above grade plane would be considered a two-story building; according to this proposal, it would be a single-story building.

In Part 1 of this proposal, we have chosen to use the term "stories in height" instead of "stories above grade plane". "Stories in height" is less awkward, and it is currently used many places in the code. "Stories in height" conveys the same meaning as "stories above grade plane". It refers to the number of stories allowed by Table 503, which is measured in stories above grade plane. If "stories above grade plane" were to be used instead, many more code sections would require revisions. The important issue is to use one term consistently throughout the code.

Unnecessary language is removed from Section 506.1.1, since Part 1 clarified that basements are not stories above grade plane.

Note that this proposal deals only with Chapters 1 through 10. Changes to other chapters can be proposed in the next code cycle.

Part 2 of the proposal revises the definitions of "basement" and "story above grade plane". Section 202 defines the term "basement" as a portion of a building that is at least partly below grade plane. The definition doesn't specify a minimum amount of the portion that's below grade plane, or how far below grade plane. A portion of a building that has one corner located one foot below grade plane is, therefore, a basement according to the current definition. The definition contains a discussion of when a basement is considered a story above grade plane, but that discussion doesn't affect the determination of whether a portion of a building is a basement. A portion of a building can be both a basement and a story above grade plane. This proposal makes "basement" and "story above grade plane" mutually-exclusive terms.

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

Analysis: For consistency in the code, the General Committee will make the determination for entire proposal.

Committee Action: Approved as Modified

Modify the proposal as follows:

507.3 Sprinklered, one story. The area of a Group B, F, M or S building no more than one-story in height<u>,</u> or a Group A-4 building no more than one-story in height<u>,</u> of other than Type V construction, shall not be limited when the building is provided with an automatic sprinkler system throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

Exceptions:

1. Buildings and structures of Type I and II construction for rack storage facilities that do not have access by the public shall not be limited in height, provided that such buildings conform to the requirements of Sections 507.2 and 903.3.1.1 and NFPA 230.
2. The automatic sprinkler system shall not be required in areas occupied for indoor participant sports, such as tennis, skating, swimming and equestrian activities in occupancies in Group A-4, provided that:
   - 2.1. Exit doors directly to the outside are provided for occupants of the participant sports areas; and
   - 2.2. The building is equipped with a fire alarm system with manual fire alarm boxes installed in accordance with Section 907.
3. Group A-1 and A-2 occupancies of other than Type V construction shall be permitted, provided:
   - 3.1. All assembly occupancies are separated from other spaces as required for separated uses in Section 508.3.3.4 with no reduction allowed in the fire-resistance rating of the separation based upon the installation of an automatic sprinkler system;
   - 3.2. Each Group A occupancy shall not exceed the maximum allowable area permitted in Section 503.1; and
   - 3.3. All required exits shall discharge directly to the exterior.

STORY ABOVE GRADE PLANE. Any story having its finished floor surface entirely above grade plane, or in which the finished surface of the floor <u>above</u> 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.

(Portions of proposal not shown remain unchanged)

Committee Reason: This proposal clarified the use of the term basement throughout the code. See also the proponents reason. The first amendment to Section 507.3 was based upon a concern with grammar. The modification retains commas that were initially struck out. The second amendment places the term "above" back in the definition of story above grade plane to retain the intent of the definition.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle, WA, Department of Planning and Development, requests Approval as Modified by this public comment.

Further modify proposal as follows:

[F] 415.6.2.1.1 Height exception. Where storage tanks are located within ~~only~~ a building no more than one story ~~in height~~ above grade plane, the height limitation of Section 503 shall not apply for Group H.

505.4 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.

507.3 Sprinklered, one story. The area of a Group B, F, M or S building no more than one-story ~~in height~~ above grade plane or a Group A-4 building no more than one-story ~~in height~~ above grade plane of other than Type V construction, shall not be limited when the building is provided with an automatic sprinkler system throughout in accordance with Section 903.3.1.1 and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

Exceptions:

1. Buildings and structures of Type I and II construction for rack storage facilities that do not have access by the public shall not be limited in height, provided that such buildings conform to the requirements of Sections 507.2 and 903.3.1.1 and NFPA 230.
2. The automatic sprinkler system shall not be required in areas occupied for indoor participant sports, such as tennis, skating, swimming and equestrian activities in occupancies in Group A-4, provided that:
   2.1. Exit doors directly to the outside are provided for occupants of the participant sports areas; and
   2.2. The building is equipped with a fire alarm system with manual fire alarm boxes installed in accordance with Section 907.
3. Group A-1 and A-2 occupancies of other than Type V construction shall be permitted, provided:
   3.1. All assembly occupancies are separated from other spaces as required for separated uses in Section 508.3.3.4 with no reduction allowed in the fire-resistance rating of the separation based upon the installation of an automatic sprinkler system;
   3.2. Each Group A occupancy shall not exceed the maximum allowable area permitted in Section 503.1; and
   3.3. All required exits shall discharge directly to the exterior.

507.4 Two story. The area of a Group B, F, M or S building no more than two stories ~~in height~~ above grade plane shall not be limited when the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, and is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.6 Group A-3 buildings. The area of a Group A-3 building no more than one-story ~~in height~~ above grade plane used as a place of religious worship, community hall, dance hall, exhibition hall, gymnasium, lecture hall, indoor swimming pool or tennis court of Type II construction shall not be limited when all of the following criteria are met:

1. The building shall not have a stage other than a platform.
2. The building shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
3. The assembly floor shall be located at or within 21 inches (533 mm) of street or grade level and all exits are provided with ramps complying with Section 1010.1 to the street or grade level.
4. The building shall be surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

507.8 Aircraft paint hangar. The area of a Group H-2 aircraft paint hangar no more than one-story ~~in height~~ above grade plane, shall not be limited where such aircraft paint hangar complies with the provisions of Section 412.4 and is entirely surrounded by public ways or yards not less in width than one and one-half times the height of the building.

507.9 Group E buildings. The area of a Group E building no more than one-story ~~in height~~ above grade plane, of Type II, IIIA or IV construction shall not be limited when the following criteria are met:

1. Each classroom shall have not less than two means of egress, with one of the means of egress being a direct exit to the outside of the building complying with Section 1018.
2. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
3. The building is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.

509.8 Group B or M with Group S-2 open parking garage above. Group B or M uses located in the basement or first story above grade plane below a Group S-2 open parking garage shall be classified as a separate and distinct building for the purpose of determining the type of construction when all of the following conditions are met:

1. The basement or first story above grade plane shall be Type I or II construction, but not less than the type of construction required for the open parking garage above. The height and area of the basement or first story shall not exceed the limitations in Section 503 for the Group B or M uses.

2. The height and area of the open parking garage shall not exceed the limitations permitted under Section 406.3. The height, in both feet and stories, of the open parking garage shall be measured from grade plane and include both the open parking garage and the basement or first story above grade plane.
3. Fire separation assemblies between the open parking garage and the occupancy located in the basement or on the first story above grade plane ~~occupancy~~ shall correspond to the required fire-resistance rating prescribed by Table 508.3.3.
4. Exits serving the open parking garage shall discharge directly to a street or public way and shall be separated from the occupancy located in the basement or on the first story above grade plane ~~occupancy~~ by not less than 2-hour fire barriers constructed in accordance with Section 706 or 2-hour horizontal assemblies constructed in accordance with Section 711, or both, with opening protectives in accordance with Table 715.4.

[F] 903.2.8.1 Repair garages. An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406, as shown:

1. Buildings having two or more stories above grade plane, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m^2).
2. Buildings no more than one story ~~in height~~ above grade plane, with a fire area containing a repair garage exceeding 12,000 square feet (1115 m^2).
3. Buildings with a repair garage servicing vehicles parked in the basement.

1009.11 Stairway to roof. In buildings four or more stories ~~in height~~ above grade plane, one stairway shall extend to the roof surface, unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope). In buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an alternating tread device.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: These modifications are proposed for the sake of consistency with the Code Development Committee action on G6-06/07. G6-06/07 changed several code sections from "…stories in height" to "…stories above grade plane". Together, G6-06/07 and G8-06/07 clarify that when the number of stories is used to trigger a code requirement in the affected sections, the code is referring to the number of stories above grade plane.

Final Action: AS AM AMPC _______ D

G10-06/07
506.1.1, 109.3.3, 412.2.2, [F] 415.4, 202, 502.1

Proposed Change as Submitted:

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

Revise as follows:

506.1.1 Basements. A single basement that is not a story above grade plane need not be included in the total allowable building area, provided such basement does not exceed the area permitted for a building with no more than one story above grade plane.

Exception: In buildings of Type I, IIA, IIIA, IV or VA construction, the basements below the first story above grade plane need not be included in the total allowable building area provided each such basement does not exceed the area permitted for a building with no more than one story above grade plane.

109.3.3 Lowest floor elevation. In flood hazard areas, upon placement of the lowest floor, including the basements, and prior to further vertical construction, the elevation certification required in Section 1612.5 shall be submitted to the building official.

412.2.2 Basements. Where hangars have basements, the floor over the basement shall be of Type IA construction and shall be made tight against seepage of water, oil or vapors. There shall be no opening or communication between the basements and the hangar. Access to the basements shall be from outside only.

[F] 415.4 Special provisions for Group H-1 occupancies. Group H-1 occupancies shall be in buildings used for no other purpose, shall not exceed one story in height and be without ~~a~~ basements, crawl spaces or other under-floor spaces. Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature. Group H-1 occupancies containing materials which are in themselves both physical and health hazards in quantities exceeding the maximum allowable quantities per control area in Table 307.1.(2) shall comply with requirements for both Group H-1 and H-4 occupancies.

SECTION 202
DEFINITIONS

STORY. That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above, including basements (also see "Mezzanine" and Section 502.1). It is measured as the vertical distance from top to top of two successive tiers of beams or 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.

STORY ABOVE GRADE PLANE. Any story having its finished floor surface entirely above grade plane, except that a basement shall be considered as a story above grade plane where the finished surface of the floor or roof next 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.

502.1 Definitions.

BASEMENT. ~~That portion of a building~~ A story 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 or roof next 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.

Reason: Currently, the IBC does not refer to the basement in a consistent manner. At times, the IBC considers it to be all floor levels "partly or completely below grade plane" (see definition of "basement" in Section 502.1). At other times, the IBC considers it to be a single floor level partly or completely below grade plane. The purpose of this proposal is to refer to a basement in a consistent manner throughout the IBC. The method chosen is to consider it as a single floor level partly or completely below grade plane.

The IBC currently defines "story" as "that portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above" (see Section 502.1). Thus, each portion of a building between floor levels and between a floor level and a roof is a story, including basements. While "floor level" implies a horizontal surface, "story" is a vertical space. The proposed modification to the definition of "basement" in Section 502.1 aligns it with the current definition of "story." Thus, it becomes a story that is partly or completely below grade plane.

The phrase "floor above" is changed to "floor or roof next above" in the definitions of "story above grade plane" and "basement." This addresses the possibility of a basement that is sufficiently above grade plane to qualify as a story above grade plane. If it is the topmost story in a building, however, it would not currently qualify as a story above grade plane since there would not be a finished surface of a floor above to measure from. The change from "above" to "next above" is for consistency with similar language in the current definition of "story."

The proposed revisions are similar to those contained in code change proposals G107-04/05 and G108-04/05. During the code development hearings in Cincinnati, the Committee raised concerns that the proposed revision to Section 506.1.1 would be inconsistent with the expressed intent of the Committee during the 2003/2004 code development cycle. This is likely a reference to code change proposal G98-03/04, which proposed deletion of Section 503.1.1 and was approved as submitted. The stated reason was that the "general provisions of Section 503.1.1 are currently duplicated in Section 506.1.1." Sections 503.1.1 and 506.1.1 in the 2003 IBC, however, are not identical. Section 503.1.1 states that "basements need not be included in the total allowable area provided they do not exceed the area permitted for a one-story building." Section 506.1.1 is similar except it exempts a "single basement" from being included. I believe the inconsistency is not between this proposal and Proposal G98-03/04 but with the manner in which a "basement" is currently treated in the IBC. The proposed modifications will make the provisions of the IBC related to basements consistent.

Consider the following example. Imagine a building that is eight stories in height. Grade plane is located at the upper surface of the floor at Story #5, which also places it at the upper surface of the floor above Story #4. Thus, there are four stories above grade plane (Stories #5 through #8) and four stories below grade plane (Stories #1 through #4). Stories #1 through #4 are completely below grade plane, which means that they are also basements. If a "single basement" is one story in height, the current language of Section 506.1.1 would exempt Story #1 from the total allowable area. The building would still have four stories above grade plane but the uppermost seven stories would be included in the determination of allowable building area. If a "single basement" includes all stories below the first story above grade plane that are also partly or completely below grade plane, the building would have four stories above grade plane but the uppermost four (not seven) stories would be included in the determination of allowable building area. I believe the second part of the example illustrates the basic intent of the IBC. The proposed modifications accomplish what the second part of the example illustrates. See the accompanying diagram for further information.

During debate on code change proposals G107-04/05 and G108-04/05 at the final action hearings in Detroit, it was suggested that Section 506.1.1 is derived from a report by the CABO Board for the Coordination of the Model Codes (BCMC) on building heights and areas, dated February 9, 1988. It is correct that the current language in IBC Section 506.1 is similar to Section 4.1.2 of the BCMC report but the recommendations in the report were not fully adopted by any of the model code organizations, whose provisions on building areas and heights also differed substantially. Note that the recommendations in the report were published 18 years ago. There has been substantial development in building code provisions for building heights and areas since then.

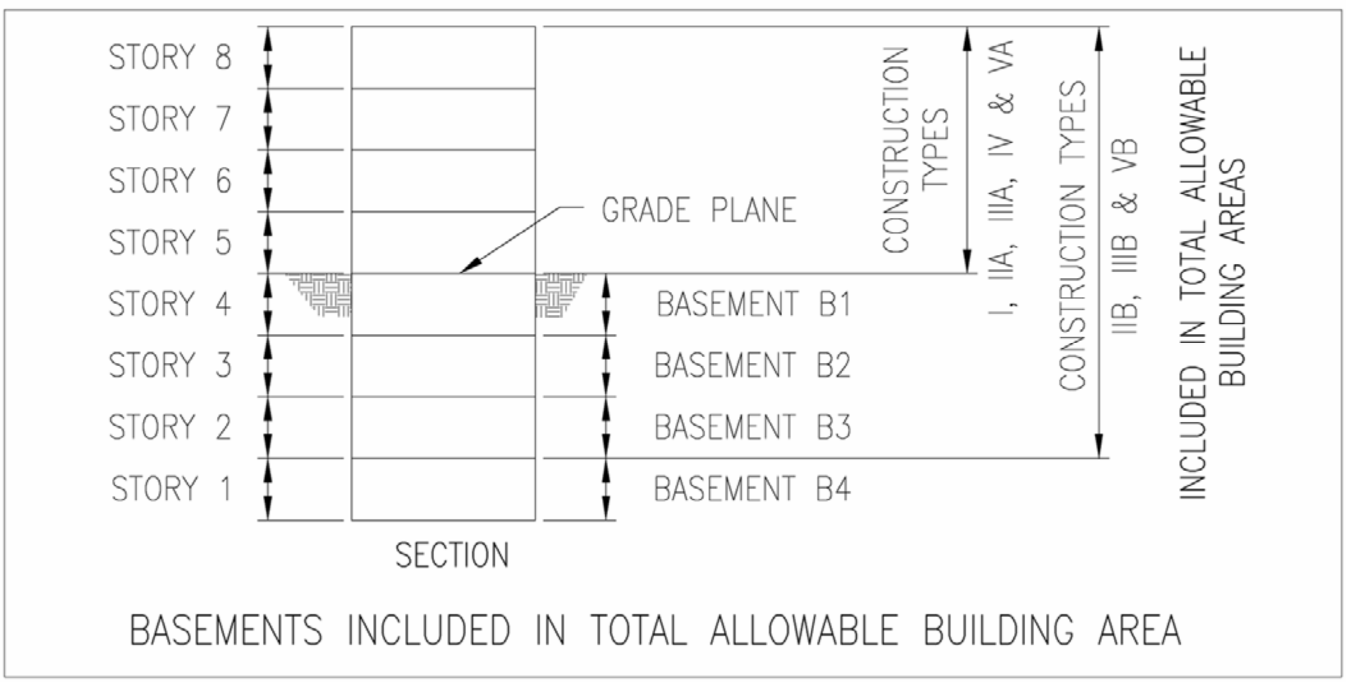
The building code places limitations on building area, building height and number of stories because (1) a building's occupants need to escape during an emergency, and (2) fire fighters and other emergency responders need to rescue occupants who are unable to escape and suppress the cause of the emergency (i.e., building fire). Occupants typically escape from a building at grade (level of exit discharge). Emergency responders typically approach a building for rescue and fire fighting purposes at grade. The larger the building area, the higher the building height or the greater the number of stories, the more difficult it is for occupants to escape and emergency responders to perform rescue and fire fighting operations. The limitations on building area, building height and number of stories should be determined from grade because the consequences to occupants and emergency responders are largely due to their quantities measured from grade.

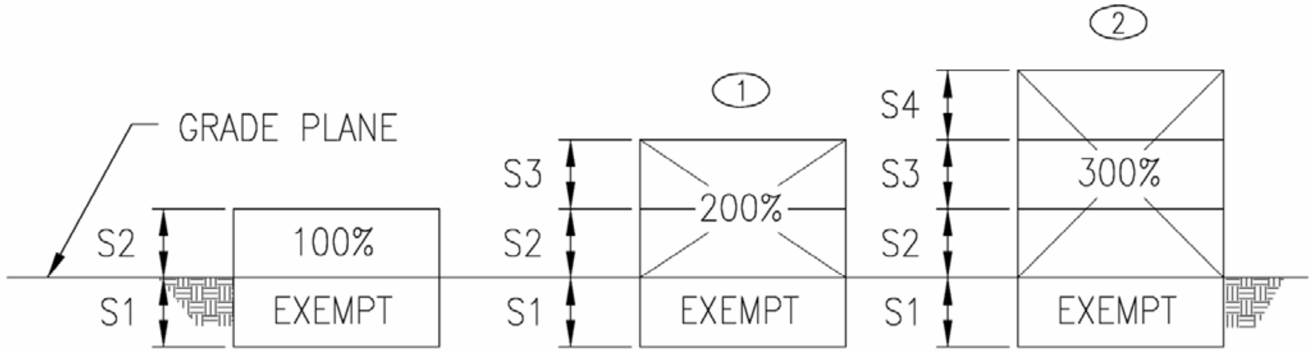
An exception to this, however, is the fuel load in a building, which increases with the number of stories above the foundation rather than above grade. But multistory buildings are typically constructed with fire-resistance-rated horizontal assemblies supported by fire-resistance-rated structural frames (e.g., columns, beams, bearing walls, etc.), which typically form separate fire areas at each story. This occurs at buildings of Type I, IIA, IIIA, IV or VA construction. The fuel load of an individual story rather than the entire building typically impacts egress and emergency response and is affected by the location of the story above or below grade. There are also other mitigating factors affecting the impact of fire load, notably automatic fire sprinkler systems, which are typically required at stories below grade due to a lack of fire access openings and other factors.

Multistory buildings, however, are not always of Type I, IIA, IIIA, IV or VA construction. A building of Type IIB, IIIB or VB construction is typically nonrated except for specific areas separate or enclosed by fire containment assemblies (e.g., horizontal exits, shaft enclosures, exit enclosures, etc.). There is typically a single fire area in the building extending from the foundation to the roof, encompassing all areas of the building not otherwise separated or enclosed. The fuel load affecting occupants and emergency responders is not necessarily limited to a single story but can potentially extend to all areas of the building. The installation of an automatic fire sprinkler system at the stories below grade is an effective method of fire protection but it lacks redundancy. There is no means of limiting the fire area to a single story as there is for a building of Type I, IIA, IIIA, IV or VA construction.

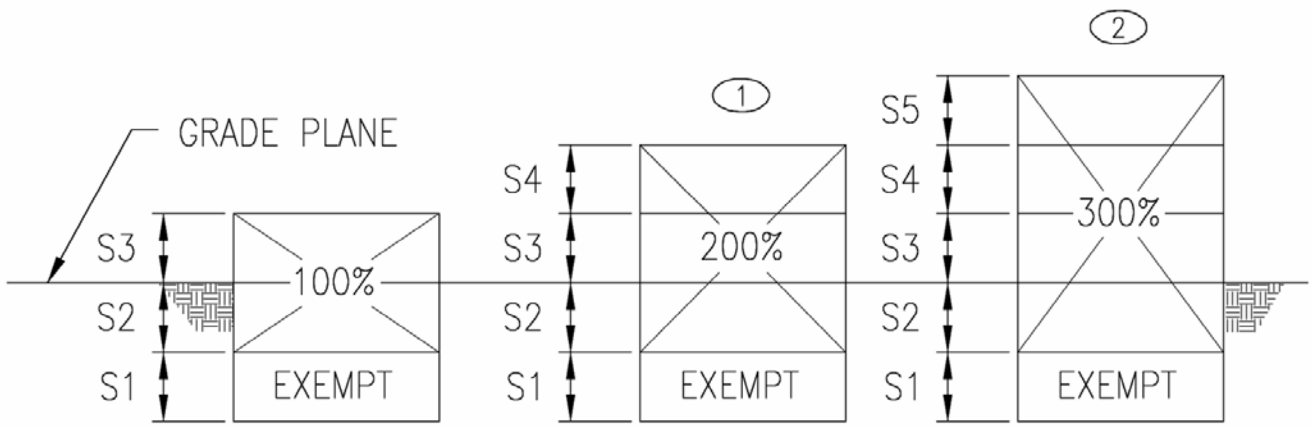
This proposal does not revise the exemption for a single basement that is not a story above grade plane from being included in the allowable building area. But it does establish an exception for buildings of I, IIA, IIIA, IV or VA construction permitting all basements below the first story above grade plane from being included in the allowable building area. This is due principally to the establishment of separate fire areas at each story.

Three diagrams accompany this proposal. The first diagram illustrates the locations of the stories and basements described in the example above. It also specifies which basements would be included in the total allowable building area if the proposal is approved. The second and third diagrams illustrate how the determination of the maximum area of a building with more than one story above grade plane (Section 506.4) would be affected by the proposal. One diagram illustrates the affect on buildings of Type IIB, IIIB or VB construction. The other diagram illustrates the affect on buildings of Type I, IIA, IIIA, IV or VA construction.





SECTION

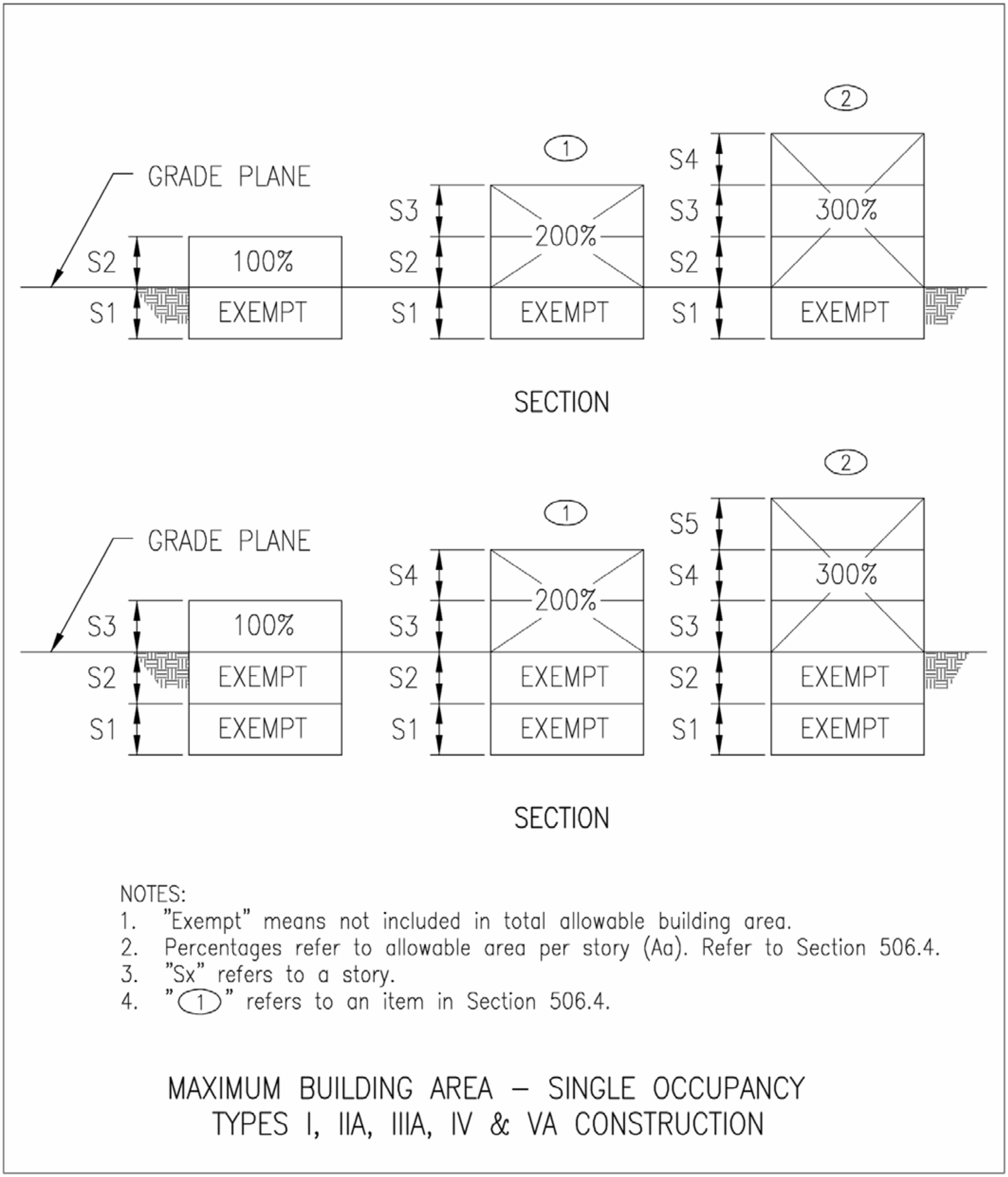


SECTION

NOTES:

1. "Exempt" means not included in total allowable building area.
2. Percentages refer to allowable area per story (Aa). Refer to Section 506.4.
3. "Sx" refers to a story.
4. "1" refers to an item in Section 506.4.

MAXIMUM BUILDING AREA – SINGLE OCCUPANCY
TYPES IIB, IIIB & VB CONSTRUCTION



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

Analysis. While some sections listed are typically the purview of other committees, for consistency, the General Committee will make the determination for entire proposal.

Committee Action: **Disapproved**

Committee Reason: This proposal was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort to address concerns with the heights and areas within the code at the ICC Code Technology Committee. The intent is to form a working group to prepare a single public comment for the Rochester 07 meeting. The proponents include representatives from Alliance for fire and Smoke Containment and Control, American Forest and Paper Association, American Institute of Architects. American Iron and Steel Institute, Building Officials of Florida, Building Owners and Managers Association, California Building Officials, California Fire Chiefs Association, California State Fire Marshal's Office, ICC Tri-Chapter of Building Officials, National Association of State Fire Marshals, National Multi-housing Council and the US General Services Administration. The proposals included are as follows:

G10-06/07
G95-06/07
G99-06/07
G100-06/07
G101-06/07
G102-06/07
G103-06/07
G104-06/07
G105-06/07
G106-06/07
G107-06/07
G108-06/07
G109-06/07
G110-06/07
G111-06/07
G112-06/07
G113-06/07
G114-06/07
G115-06/07
G116-06/07
G117-06/07
G118-06/07
G120-06/07
G121-06/07
G122-06/07
G123-06/07
G223-06/07

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful and a public comment was submitted.

Public Comment:

Philip Brazil, Reid Middleton, Inc., representing himself, requests Approval as Submitted

Commenter's Reason: At the 2006/2007 ICC code development hearings in Orlando, I agreed to ask for disapproval in conjunction with the initiative by several organizations to pursue resolution to the ongoing differences over the IBC provisions for allowable building heights and building areas, specifically through the efforts of the ICC Code Technology Committee. At the time of the deadline to submit public comments for consideration at the final action hearings in Rochester, that effort was ongoing. Consequently, I am asking for approval as submitted based on the original reason statement.

Final Action: AS AM AMPC _______ D

G11-06/07, Part I
101.3

Proposed Change as Submitted:

Proponent: Carroll Lee Pruitt, FAIA, Pruitt Consulting, Inc.

PART I – IBC GENERAL

Revise as follows:

101.3 Intent. The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations. It is not intended for this code to prevent injury to an individual or group of individuals for their failure to take appropriate precautions in providing for their own safety and welfare.

Reason: The purpose of the code change is to recognize that individuals have a responsibility for their own safety and welfare while within the built environment. Forensic engineers routinely and inappropriately reference the building or residential code as the reason for it being the building owner or operators fault that individuals were injured within a building or on its grounds when the individuals failure to be aware or their surroundings and conditions within a building were, at least, partially at fault for their accident or injury. This language will make it more difficult to reference the building or residential code inappropriately in litigation cases.

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

Committee Action: Disapproved

Committee Reason: The proposal was disapproved based upon concern related to how the provisions would be enforced.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carroll Lee Pruitt, Pruitt Consulting, Inc., representing North Texas Chapter of ICC, requests Approval Modified by this public comment for Part I.

Replace proposal with the following:

101.3 Intent. The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations. It is not the intent of this code to prevent injuries when the unreasonable behavior of an individual or group of individuals puts themselves or others at undue risk of physical harm.

Commenter's Reason: It is important to note that the code cannot protect individuals or groups of individuals when they act unreasonably within the building. Occupants of buildings must take a proactive role in providing for their own safety and the safety of those around them. The building code will never cover ever potential incident or hazard that might exist in a building. This code change simply clarifies the intent of the code and is not intended to start a long laundry list of what the code does not cover. The intent of the code is widely misused in litigation in existing buildings with supposed experts stating that harm was caused because a building was not compliant with the CURRENT code even though the building may be 10, 20 30 or yes even more that a hundred years old. There is similar language in NFPA 101. This code change does not create any enforcement activity, but will benefit building owners subjected to inappropriate lawsuits.

Final Action: AS AM AMPC _______ D

G11-06/07, Part II
R101.3

Proposed Change as Submitted:

Proponent: Carroll Lee Pruitt, FAIA, Pruitt Consulting, Inc.

PART II – IRC BUILDING/ENERGY

Revise as follows:

R101.3 Purpose. The purpose of this code is to provide minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment. It is not intended for this code to prevent injury to an individual or group of individuals for their failure to take appropriate precautions in providing for their own safety and welfare.

Reason: The purpose of the code change is to recognize that individuals have a responsibility for their own safety and welfare while within the built environment. Forensic engineers routinely and inappropriately reference the building or residential code as the reason for it being the building owner or operators fault that individuals were injured within a building or on its grounds when the individuals failure to be aware or their surroundings and conditions within a building were, at least, partially at fault for their accident or injury. This language will make it more difficult to reference the building or residential code inappropriately in litigation cases.

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

Committee Action: Disapproved

Committee Reason: The proposed language appeared to be commentary language and was not appropriate for the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carroll Lee Pruitt, Pruitt Consulting, Inc., representing North Texas Chapter of ICC, requests Approval Modified by this public comment for Part II.

Replace proposal with the following:

R101.3 Purpose. The purpose of this code is to provide minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment. <u>It is not the intent of this code to prevent injuries when the unreasonable behavior of an individual or group of individuals puts themselves or others at undue risk of physical harm.</u>

Commenter's Reason: It is important to note that the code cannot protect individuals or groups of individuals when they act unreasonably within the building. Occupants of buildings must take a proactive role in providing for their own safety and the safety of those around them. The building code will never cover ever potential incident or hazard that might exist in a building. This code change simply clarifies the intent of the code and is not intended to start a long laundry list of what the code does not cover. The intent of the code is widely misused in litigation in existing buildings with supposed experts stating that harm was caused because a building was not compliant with the CURRENT code even though the building may be 10, 20 30 or yes even more that a hundred years old. There is similar language in NFPA 101. This code change does not create any enforcement activity, but will benefit building owners subjected to inappropriate lawsuits.

Final Action: AS AM AMPC _______ D

G12-06/07

102.4, 102.7 (New)

Proposed Change as Submitted:

Proponent: Rebecca Baker, Jefferson County, CO, Chair, ICC Ad Hoc Committee on the Administrative Provisions in the I-Codes (AHC-Admin)

1. Revise as follows:

102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

> <u>**Exception:** Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and the manufacturer's instructions shall govern.</u>

2. Add new text as follows:

<u>**102.7 Additions, alterations or repairs.** Additions, alterations or repairs to any structure shall comply with Section 3403.1.</u>

Reason: Consistency and coordination among the I-Codes is one of the cornerstones of the ICC Code Development Process. This holds true for not only the technical code provisions but also for the administrative code provisions as contained in Chapter 1 of all the I-Codes.

In response to concerns raised by the ICC membership since publication of the first editions of the I-Codes, the ICC Board established the Ad Hoc Committee on the Administrative Provisions in the I-Codes (AHC-Admin) to review Chapter 1 administrative provisions in each code in the International Codes family and improve the correlation among the I-Codes through the code development process. In order to ensure that this correlation process will continue in an orderly fashion, it is also anticipated that future code development and maintenance of the administrative provisions of the I-Codes family will be overseen by a single, multi-discipline code development committee.

The AHC-Admin is submitting a series of code change proposals designed to provide consistent and correlated administrative provisions among the I-Codes using existing I-Code texts, as noted. The intent of this correlation effort is not to have absolutely identical text in each of the I-Codes but, rather, text that has the same intent in accomplishing the administrative tasks among the I-Codes. While some proposed text may be "new" because it was judged by the AHC to be necessary to this particular code, it is not new to the I-Code family, since it already exists in one or more of the International Codes. Unless otherwise noted, there are no technical changes being proposed to the section. A comparative matrix of current I-Codes Chapter 1 text may be found on the ICC website at www.iccsafe.org/cs/cc/admin/index.html.

This proposal focuses on the general provisions in the IBC. A section-by-section discussion follows:

102.4: The purpose of this proposed change is to provide correlation with current Section 102.8 of the *International Fuel Gas Code*, and Section 102.4 of the *International Residential Code* by adding an exception that recognizes the extremely unlikely but possible occurrence of the code requiring or allowing something less restrictive or stringent than the product's listing or manufacturer's instructions. This correlation will provide an added level of safety by recognizing and deferring to the expertise of the manufacturer and the independent testing laboratory process and fill a gap that currently exists in the IBC. The intent is for the highest level of safety to prevail.

A similar correlating proposal has also been submitted to the *International Existing Building Code*, *International Fire Code, International Plumbing Code, International Private Sewage Disposal Code*, *International Property Maintenance Code, International Energy Conservation Code* and *International Wildland-Urban Interface Code.*

102.7: The intent of this proposed change is to provide correlation of the IBC with current Section 102.7.1 of the *International Residential Code*, and *International Existing Building Code*, and Section 102.4 of the *International Fuel Gas Code*, *International Mechanical Code*, *International Private Sewage Disposal Code,* and *International Plumbing Code* and Section 102.1.3 of the *ICC Electrical Code---Administrative Provisions.* While those current texts contain the requirements for additions, alterations or repairs, those requirements appear in Section 3403.1 in the IBC. This proposal will provide the code user with a useful cross reference while correlating the content of Section 102 across the I-Codes.

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

Committee Action: Disapproved

Committee Reason: The proposal was disapproved based upon concerns of the listing possibly being less restrictive than the code and possibly creating an unsafe situation. See also committee reason for G3-06/07. The assembly voted for the proposal as modified as it was felt that this section would ensure that both the code and the listing are complied with. The modification reflected the concern that the listing should prevail over the manufacturers instructions.

Assembly Action: Approved as Modified

Modify proposal as follows:

102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing ~~and the manufacturer's instructions~~ shall govern.

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful.

Final Action: AS AM AMPC _______ D

G38-06/07, Part I
303.1, 305.2, 308.5.2; IFC [B] 202

Proposed Change as Submitted:

Proponent: Paul K. Heilstedt, PE, Chair, ICC Code Technology Committee (CTC)

PART I – IBC GENERAL

1. Revise as follows:

303.1 Assembly Group A. Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption; or awaiting transportation.

Exceptions:

1. A building used for assembly purposes with an occupant load of less than 50 persons shall be classified as a Group B occupancy.
2. A room or space used for assembly purposes with an occupant load of less than 50 persons and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
3. A room or space used for assembly purposes that is less than 750 square feet (70 m2) in area and is accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.

Assembly occupancies shall include the following:

A-1 Assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures including, but not limited to:

Motion picture theaters
Symphony and concert halls
Television and radio studios admitting an audience
Theaters

A-2 Assembly uses intended for food and/or drink consumption including, but not limited to:
Banquet halls
Night clubs
Restaurants
Taverns and bars

A-3 Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to:

<u>Adult care facilities in accordance with Section 308.5.1</u>
Amusement arcades
Art galleries
Bowling alleys
Places of religious worship
Community halls
Courtrooms
Dance halls (not including food or drink consumption)
Exhibition halls
Funeral parlors
Gymnasiums (without spectator seating)
Indoor swimming pools (without spectator seating)
Indoor tennis courts (without spectator seating)
Lecture halls
Libraries
Museums
Waiting areas in transportation terminals
Pool and billiard parlors

A-4 Assembly uses intended for viewing of indoor sporting events and activities with spectator seating including, but not limited to:

Arenas
Skating rinks
Swimming pools
Tennis courts

A-5 Assembly uses intended for participation in or viewing outdoor activities including, but not limited to: Amusement park structures

Bleachers
Grandstands
Stadiums

2. Revise as follows:

305.2 ~~Day care~~ Child Care Facility. The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than $2^1/_2$ years of age for less than 24 hours, shall be classified as a Group E occupancy.

A child care facility that provides care for more than five but no more than 100 children 2½ years or less of age, for less than 24 hours, when the rooms where such children are cared for are located on the level of exit discharge and each of these child care rooms has an exit door directly to the exterior, shall be classified as a Group E occupancy.

3. Revise as follows:

308.5.2 Child care facility. A facility that provides supervision and personal care on less than a 24-hour basis for more than five children 2½ years of age or less shall be classified as Group I-4.

> **Exception:** A child ~~day~~ care facility ~~that provides care for more than five but no more than 100 children $2^1/_2$ years or less of age, when the rooms where such children are cared for are located on the level of exit discharge and each of these child care rooms has an exit door directly to the exterior,~~ in accordance with Section 305.2 shall be classified as Group E.

Reason: The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/cc/ctc/index.html Since its inception, the CTC has held six meetings - all open to the public.

This proposed change is a result of the CTC's investigation of the area of study entitled "Day Care/Adult Care/Assisted Living". The scope of the activity is noted as:

> Study issues associated with Day Care/Adult Care and Assisted Living facilities with an emphasis on the number of occupants in relation to the supervision, and the determination of the resident's capability of responding to an emergency situation without physical assistance from the facility's supervision.

CTC notes the use of inconsistent and undefined terms in the codes which warrants further investigation. CTC notes the need for coordination of occupancy classifications within the IBC and the need for coordinating text in the IRC. This proposal is submitted in response to these issues. The CTC further notes that this area of study is not complete with regards to other aspects of the scope of the activity.

IBC 303.1: Coordination with the exception to Section 308.5.1 which states that adult care facilities where the occupants are capable of responding to an emergency are considered Group A-3.

IBC 305.2 & 308.5.2: Coordination with the exception to Section 308.5.2 for child care facilities. Where these spaces have a door leading directly outside, the spaces are to be considered Group E.

Bibliography: Interim Report No. 1 of the CTC, Area of Study – Day Care/Adult Care/Assisted Living, March 9, 2006.

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

Committee Action: **Approved as Submitted**

Committee Reason: Currently some of the occupancy classification criteria related to child care and adult care facilities are found within exceptions and not within the main body of the code. This proposal provides code language within the respective occupancy classifications in addition to the existing exceptions.

Analysis: See committee action on G46-06/07

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don K. Davies, Salt Lake City Corporation, representing the Utah Chapter of ICC, requests Disapproval for Part I.

Commenter's Reason: The current wording in the code goes too far in allowing for a 24 hour stay in a day care facility. Day care uses should be just as the names implies. Sometimes emergencies arise and a few children may have to spend the night but that should never be suggested nor encouraged. To allow 100 children less than 2 ½ years of age to spend the night in an "E" occupancy is very different situation from the typical day care. Comparing "E" occupancies in table 503 with other uses one can soon see that they are one of the least restricted uses in area only exceeded by F-2 and S-2 occupancies. Fire sprinkling thresholds for "E" occupancies in Section 903 exceed all other occupancies except for the few occupancies where sprinkling is not required. A child in an R-3 occupancy under the I.B.C. is afforded more protection for fire sprinkling than 100 children under the age of 2 ½. This whole concept in the code is flawed and this change only perpetuates the problem.

Final Action: AS AM AMPC _______ D

G38-06/07, Part II
IRC R101.2.1 (New)

Proposed Change as Submitted:

Proponent: Paul K. Heilstedt, PE, Chair, ICC Code Technology Committee (CTC)

PART II – IRC BUILDING/ENERGY

Add new text as follows:

R101.2.1 Care facilities. Where permitted in accordance with the *International Building Code*, the provisions of the *International Residential Code* shall be permitted to apply to adult care facilities, child care facilities and residential care/assisted living facilities as defined in the *International Building Code*.

Reason: The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/cc/ctc/index.html Since its inception, the CTC has held six meetings - all open to the public.

This proposed change is a result of the CTC's investigation of the area of study entitled "Day Care/Adult Care/Assisted Living". The scope of the activity is noted as:

> Study issues associated with Day Care/Adult Care and Assisted Living facilities with an emphasis on the number of occupants in relation to the supervision, and the determination of the resident's capability of responding to an emergency situation without physical assistance from the facility's supervision.

CTC notes the use of inconsistent and undefined terms in the codes which warrants further investigation. CTC notes the need for coordination of occupancy classifications within the IBC and the need for coordinating text in the IRC. This proposal is submitted in response to these issues. The CTC further notes that this area of study is not complete with regards to other aspects of the scope of the activity.

IRC R101.2.1: In IBC Section 310.1, under R-3, both the 2003 and 2006 editions of the IBC permit adult and child care facilities within a single family home to comply with the IRC. This effectively provides for a limited change in scope to the IRC and should be acknowledged within the IRC. A reference to the IBC, in lieu of specific text in the IRC describing such facilities, will allow for subsequent changes to the requirements in the IBC without a necessary correlative change to the IRC as the IRC refers to the IBC for the applicable requirements.

Bibliography: Interim Report No. 1 of the CTC, Area of Study – Day Care/Adult Care/Assisted Living, March 9, 2006.

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

Committee Action: **Disapproved**

Committee Reason: The committee felt that a new occupancy should not be introduced into the IRC. In addition, the proposed code language contains inconsistent and undefined terms.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful and public comments were submitted.

Public Comment 1:

Paul K. Heilstedt, PE, Chair, ICC Code Technology Committee (CTC) requests Approval as Submitted for Part II.

Commenter's Reason: The code change to the IRC does not introduce a new occupancy into the IRC. It merely recognizes that the IBC currently allows, via reference to the IRC, buildings of certain types of occupancies to be constructed according to the IRC. This reference from the IBC, and its application, applies regardless of the lack of coordinating text in the IRC. This proposal is in affect editorial, and has been recognized as such by the successful assembly action at the Orlando Code Development Hearings.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning and Development requests Approval as Modified by this public comment for Part II

Modify proposal as follows:

R101.2.1 Care facilities. ~~Where permitted in accordance with the *International Building Code*, t~~<u>T</u>he provisions of the *International Residential Code* ~~shall be~~ <u>are</u> permitted to apply to:

<u>1</u> <u>Facilities that provide accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services where occupants are capable of responding to an emergency situation without physical assistance from the staff (See International Building Code Section 308.5.1);</u>

2. Adult care facilities <u>that provide accommodations for five or fewer persons of any age for less than 24 hours (See International Building Code Section 310.1)</u>,
3. Child care facilities <u>that provide accommodations for five or fewer persons of any age for less than 24 hours (See International Building Code Section 310.1),</u> and
4. Residential care/assisted living facilities <u>including more than 5 but not more than 16 occupants excluding staff (See International Building Code Section 310.1)</u> ~~as defined in the *International Building Code*~~**.**

Commenter's Reason: G38-06/07 identifies a conflict between the IBC and IRC that should be resolved. The IBC states that these certain occupancies are allowed to comply with the IRC, but the IRC doesn't include them within its scope. This is one of two modifications we are submitting to help align the two codes.

The original proposal lists the uses that are to be included in the scope of the IRC and states they are "as defined in the International Building Code". However, those phrases are not found in Chapter 2 of the IBC, so the reader of the IRC needs assistance in determining what the terms mean. This modification adds the descriptions of "adult care facilities" and "child care facilities" to this new section of the IRC. In addition, G46-06/07, which was approved by the Code Development Committee, added "facilities that provide accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services where occupants are capable of responding to an emergency situation without physical assistance from the staff" to Group R-3.

Public Comment 3:

Maureen Traxler, City of Seattle Department of Planning and Development requests Approval as Modified by this public comment for Part II.

Modify proposal as follows:

R101.2.1 Care facilities. ~~Where permitted in accordance with the *International Building Code*, t~~<u>T</u>he provisions of the *International Residential Code* ~~shall be~~ <u>are</u> permitted to apply to adult care facilities, child care facilities and residential care/assisted living facilities ~~as defined~~ <u>in accordance with Sections 308.5.1 and 310.1 of</u> ~~in~~ the *International Building Code***.**

Commenter's Reason: G38-06/07 identifies a conflict between the IBC and IRC that should be resolved. The IBC states that these certain occupancies are allowed to comply with the IRC, but the IRC doesn't include them within its scope. This is one of two modification we are submitting to help align the two codes.

In this modification, cross references to the pertinent section of the IBC are added to help the IRC user determine what the terms mean. The pertinent provisions are currently found in Section 310.1; G46-06/07, which was approved by the Code Development Committee, adds another relevant provisions to Section 308.5.1. We have submitted an alternative proposal which adds the descriptions of the terms to the IRC.

Final Action: AS AM AMPC _______ D

G41-06/07
304.1, IFC [B] 202, 503.1.4 (New), 508.3.1.3, 508.3.2.3, 508.3.3.4

Proposed Change as Submitted:

Proponent: John Williams, Construction Review Services, WA State Department of Health

1. Revise as follows:

304.1 Business Group B. Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

Airport traffic control towers
Ambulatory surgery centers
Animal hospitals, kennels and pounds
Banks
Barber and beauty shops
Car wash
Civic administration
Clinic—outpatient
Dry cleaning and laundries: pick-up and delivery stations and self-service
Educational occupancies for students above the 12th grade
Electronic data processing
Laboratories: testing and research
Motor vehicle showrooms
Post offices
Print shops
Professional services (architects, attorneys, dentists, physicians, engineers, etc.)
Radio and television stations
Telephone exchanges
Training and skill development not within a school or academic program

2. Add new text as follows:

503.1.4 Ambulatory surgery centers. In Group B ambulatory surgery centers multistory construction shall only be permitted where a building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

3. Revise as follows:

508.3.1.3 Separation. No separation is required between accessory occupancies or the main occupancy.

Exceptions:

1. Group H-2, H-3, H-4 or H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.3.3.
2. Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711.

508.3.2.3 Separation. No separation is required between occupancies.

Exceptions:

1. Group H-2, H-3, H-4 or H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.3.3.

2. Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711.

508.3.3.4 Separation. Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.3.3.

Exception: Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711.

Reason: Create specific requirements for Ambulatory Surgery Centers.

The code is currently unclear on the appropriate classification of ambulatory surgery centers. The particular healthcare related occupancy does not fall under the classification of I-2 due to the fact that care is not provided on a 24 hour basis. However, these occupancies render multiple patients incapable of self preservation as part of their normal function. Due to the incapacity of patients, this occupancy is not completely characteristic of the existing B occupancy classification without the following modifications.

The added requirement to new Section 503.1.4 would require ambulatory surgery centers that are housed in multiple story, unprotected buildings (Type IIB, IIIB and IVB) to have an approved automatic sprinkler system. This restriction would only apply to ambulatory surgery centers. Occupants who are incapable of self preservation will require assistance to evacuate in a fire situation. Evacuation is greatly complicated in a multistory building. To mitigate this condition, sprinklers should be required when there is no passive protection of the structure.

The added exceptions to sections 508.3.1.3, 508.3.2.3 and 508.3.3.4 would require ambulatory surgery centers to be separate from other occupancies and other B occupancies by a 1 hour separation. Patients in the areas are being operated on. A one hour separation would allow the physician the additional time required to terminate an operation and stabilize the patient before evacuating.

Previous unsuccessful proposals have placed surgery centers with the I occupancies. These have been defeated. These buildings are not full fledged hospitals in that they do not have 24 hour care and they do not provide the scope of care that hospitals do. But they are also not typical doctors offices because patients are rendered incapable of self preservation; patients are often under general anesthesia; and often patients cannot be evacuated immediately because they are in the middle of a procedure. This proposal recognizes that surgery centers are somewhere in between. Most characteristics are like a B occupancy, while some additional safeguards are required to mitigate the special conditions of this centers.

Outpatient surgery centers are becoming more and more prevalent as certain invasive surgeries move out of hospitals and into business occupancies. The proposed changes are consistent with the requirements found within the National Fire Protection Associates publication 101, Life Safety Code. These requirements are in the Ambulatory healthcare chapter. This code is a requirement for participation in Medicaid/ Medicare.

Cost Impact: The code change proposal would increase the cost of construction for ambulatory surgery centers who are not reimbursed by Medicaid/Medicare. Ambulatory surgery centers who are reimbursed by Medicaid/Medicare must meet NFPA 101 already.

Committee Action: **Disapproved**

Committee Reason: The committee felt the issue of surgery centers needed to be addressed but there were too many questions that needed to be answered. There was a suggestion to create a sub occupancy classification under Group I. The location of the proposed sprinkler requirements should be in Chapter 9. There was a request by the proponent that an ad hoc committee be created to look at the issue of ambulatory surgery centers. This was discussed and voted on by the IBC General Committee during new business. The vote was in favor of such an ad hoc committee. G45-06/07 also resulted in the creation of an ad hoc committee for related issues.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John Williams, Construction Review Services, WA State Department of Health, requests Approval as Modified by this public comment.

Modify proposal by adding a definition as follows:

SECTION 202
DEFINITIONS

Ambulatory Surgery Center. Any building or structure, or portion thereof, used to provide outpatient services that will render four or more patients simultaneously incapable of self-preservation. Ambulatory Surgery Centers provide care for patients for less than 24 hours.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This change was reviewed by the committee as a floor modification during the hearings in Orlando. This definition supports the term in the original proposal as the modification to Chapter 9 that was recommended by the committee.

Public Comment 2:

John Williams, Construction Review Services, WA State Department of Health requests Approval as Modified by this public comment.

Modify proposal as follows:

~~**503.1.4 Ambulatory surgery centers.** In Group B ambulatory surgery centers multistory construction shall only be permitted where a building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.~~

903.2.2 Group B. An automatic sprinkler system shall be provided for Group B occupancies as follows:

1. Throughout buildings containing a multistory ambulatory surgery centers in construction types IIB, IIIB and VB.

(Renumber subsequent sections)

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This modification follows the committee's recommendation by relocating the sprinkler requirements to Chapter 9. The term "ambulatory surgery center" is defined by another public comment.

Public Comment 3:

John Williams, Construction Review Services, WA State Department of Health, requests Approval as Modified by this public comment.

Modify proposal as follows:

508.3.1.3 Separation. No separation is required between accessory occupancies or the main occupancy.

Exceptions:

1. Group H-2, H-3, H-4 or H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.3.3.
2. Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711, or both.

508.3.2.3 Separation. No separation is required between occupancies.

Exceptions:

1. Group H-2, H-3, H-4 or H-5 occupancies shall be separated from all other occupancies in accordance with Section 508.3.3.
2. Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711, or both.

508.3.3.4 Separation. Individual occupancies shall be separated from adjacent occupancies in accordance with Table 508.3.3.

Exception: Group B ambulatory surgery centers shall be separated from other tenants and other Group B Occupancies by1-hour fire barriers in accordance with Section 706 or horizontal assemblies in accordance with Section 711, or both.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The modifications to the separation requirements are intended to make the language conform to the committee approval of FS37 – 06/07. This captures an additional location in code where the terminology should be made consistent.

Final Action: AS AM AMPC _______ D

G45-06/07

308.3 (IFC [B] 202)

Proposed Change as Submitted:

Proponent: Gerald Anderson, City of Overland Park, KS

Revise as follows:

308.3 Group I-2. This occupancy shall include buildings and structures used for medical, surgical, psychiatric, nursing or custodial care ~~on a 24-hour basis~~ for more than five persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

Hospitals
~~Nursing homes (both intermediate care facilities and skilled nursing facilities)~~
Mental hospitals
Detoxification facilities

Health Care Centers for ambulatory patients receiving outpatient medical care that render the patient incapable of unassisted self preservation.
Nursing homes (both intermediate-care facilities and skilled nursing facilities) that provide care on a 24 hour basis. A facility of this type caring for five or less persons shall be classified as Group R-3 or shall comply with the *International Residential Code*.
Child care facilities that provide care on a 24-hour basis for children 2 1/2 years of age or less. A facility of this type caring for five or less persons shall be classified as Group R-3 or shall comply with the *International Residential Code*.

~~A facility such as the above with five or fewer persons shall be classified as Group R-3 or shall comply with the *International Residential Code*.~~

~~**308.3.1 Child care facility.** A child care facility that provides care on a 24-hour basis to more than five children $2^1/_2$ years of age or less shall be classified as Group I-2.~~

Reason: The purpose of this code change is to clarify the code and to clearly state that health care facilities that render patients incapable of self preservation as part of their overall care shall be consider as I-2 occupancies. What separates an I-2 facility from other types of occupancies is the fact that within this occupancy we find people of all ages who are incapable of unassisted self-preservation. For that reason and that reason alone the code places more stringent code requirements on these types of facilities. Most recently a lot has been made about the "24 hour clause". When it comes to addressing patients who are incapable of self preservation this component does not make a facility more safe or of less concern. An emergency room in a hospital typically does not treat patients for an extended period of time, yet I know of no one who would suggest that an emergency room should be view as anything other than an I-2. Why would we then suggest that an outpatient facility which may render patients incapable of self-preservation as part of the overall care be classified as anything other than an I-2.

When looking at Nursing homes (both intermediate and skilled) and child care facility, I suggest that the same problem exist. However, since my main focus at this time is to have the code address the health care centers, I have left the 24 hour clause in for these types of facilities.

I have also limited the reference to the R-3 use to those the nursing home and child care facilities caring for 5 for less people. Other types of facilities caring for five or less people would then be designated as some other occupancy type, most likely a group B. The R-3 reference seems inappropriate.

Classifying these types of health care facilities that do day surgeries as use group B is simply not the right thing to do. In the commentary on Group B uses its stated that "the occupants, because of the nature of the use, are alert, ambulatory, conscious, aware of their surroundings and generally familiar with the buildings features, particularly the means of egress". These facilities don't meet the first criteria so how can we classify them as use group B. Group B's can also be located in wood frame buildings, with no fire protection or fire alarm system. Where are the life features for the non-ambulatory patients?

Some comments raised in previous code changes were essentially suggesting that we (the code) do not have to worry about these types of facilities because they are covered by other widely adopted codes and standards in the health care industry or that they are covered by state licensing regulations. This may be true, however, it does not provide any sort of justification for this body not to address facilities of this type. It almost begs the question that if other codes and standards address these types of occupancies then why don't the I-codes.

Cost Impact: Unknown. Undoubtedly there will be cost associated with having to provide for the additional life safety features which are needed for these types of facilities.

Committee Action: Disapproved

Committee Reason: There was concern with removing the 24 hour and "more than 5" criteria currently in the main paragraph of the section. The proponent requested an ad hoc committee be created to address the concerns of the proposal. After testimony and committee discussion the committee voted to create an ad hoc committee to address the issues which focuses upon the 24 hour classification in terms of facilities such as detoxification, hospitals and outpatient clinics. This is a separate ad hoc activity from that established under G41-06/07.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don K. Davies, Salt Lake City Corporation, representing the Utah Chapter of ICC, requests Approval as Submitted.

Commenter's Reason: The 24-hour criteria for I-2 occupancies are nonenforceable. Allowing a 24-hour stay allows beds for overnight stay. Who is going to oversee that the beds are only used one night. Outpatients care facilities and similar uses should all close down and be vacated after working hours. If a patient needs overnight care they should be transported to an I-2 occupancy hospital where the patient will get the professional care needed in a fire sprinkled facility with all the needed safeguards in place.

Final Action: AS AM AMPC _______ D

G46-06/07

308.5.1 (IFC [B] 202)

Proposed Change as Submitted:

Proponent: Wayne R. Jewell, City of Southfield, MI

Revise as follows:

308.5.1 Adult care facility. A facility that provides accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

> **Exception:** A facility where occupants are capable of responding to an emergency situation without physical assistance from the staff shall be classified as Group ~~A-3~~ R-3.

Reason: When I had proposed change G-32-00 I had a serious typo an "A" was placed where an "R" should have been. I never intended for these facilities to be considered an Assembly Group and this is a correction of my error. The language in Section 310.1 for R-3 uses does speak to these uses.

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

Committee Action: **Approved as Submitted**

Committee Reason: This proposal corrects an incorrect occupancy classification**.** The current Group R-3 occupancy classifications in Section 310 correlates with this proposal.

Analysis: See committee action on G38-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Rooney, United Spinal Association, requests Disapproval.

Commenter's Reason: A Group R-3 classification for adults that are capable of self preservation in an environment that is less than 24 hours is not appropriate. Adult cay care facilities are being constructed as part of recreational facilities, portions of assisted living centers, in store fronts and as part of combination child/adult care centers. This is not a residential environment. There are several adverse consequences to this approach. With any portion of a building including a Group R-3, sprinklers would be required throughout the entire building. What is the technical justification for this in the combined facilities? In addition, there are a large number of exceptions for Group R-3 throughout the code that would have an adverse effect for the expected clientele with mobility impairments. For example, Group R-3 can use exceptions for stair tread and risers (Section 1009.3, Exp 4), size of doors (1008.1.1, Exp. 1) and thresholds (1008.1.4, Exp. 3). Section 1019.2 would allow stand alone adult day cares to be single exit buildings (Section 1019.2). Chapter 11 only deals with Type B dwelling unit criteria (Section 1107.6.3) when there are four or more units. If Type B criteria is followed, accessibility requirements would be significantly reduced vs. a fully accessible Group A-3; or if this facility is considered one unit, accessibility may not be required at all!

Final Action: AS AM AMPC _______ D

G53-06/07
402.8 (New)

Proposed Change as Submitted:

Proponent: Daniel E. Nichols, New York State Department of State

Add new text as follows:

402.8 Interior Finish. Interior wall and ceiling finishes within the mall, exits, and exit passageways shall have a minimum flame spread rating of Class B per Section 803. Interior floor finishes shall meet the requirements of Section 804.

(Renumber subsequent sections)

Reason: The purpose of this code change proposal is to clearly state the interior finish requirements within a covered mall building.

Currently, Sections 402 and 803 do not specifically state the requirements for interior finish within a covered mall building. Since a covered mall building is actually a mixed-use building, the most restrictive occupancy requirements should apply. However, some projects that we have dealt with have stated the mall portion of the covered mall building conforms with Group M requirements since a covered mall building is a Group M with all other uses being accessory.

The use of a mall space has gone beyond its original intent of providing a wide-open walking space to communicate people amongst the various shops and stores within. Mall spaces have become locations to assemble to watch a dance recital, attend a fashion show, or for the local radio station to run a promotion in. It has become clear that mall spaces are assembly spaces themselves, not taking into account the tenant assembly spaces (restaurants, movie theaters, paintball arenas, etc.) that open into them. Therefore, it seems logical to protect the mall space similar to Group A requirements.

The code change proposal adds the performance requirements of interior wall and ceiling finishes into Section 402 and references the code user to Section 803 for specifics. This method of stating performance requirements and referencing to Section 803 is currently found in Section 404 for atriums. Coincidentally, Section 404.7 also requires atrium spaces to have Class B fire spread rating for wall and ceiling finishes. Based on the type of activity occurring in both covered mall buildings and atrium spaces, it is appropriate that these to special use areas correlate with the interior wall and ceiling finish requirements of sprinklered Group A occupancies.

The 1997 Southern Building Code (Section 413.7.1) stated that a covered mall building has a Group M occupancy classification and all other occupancy types, including Group A, were accessory to the Group M. The current definition of a covered mall building has its source from the 1996 BNBC which talks of the components of a covered mall building but doesn't set Group A occupancies accessory to the retail uses. With the recognition of a mall being both a retail and entertainment venue (as specified in the definition), including specific requirements for interior wall and ceiling finishes that mirror the requirements for sprinkler Group A uses is appropriate.

Bibliography: 1997 Southern Building Code, 1996 BOCA *National Building Code*

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

Individual Consideration Agenda

Committee Action: **Approved as Modified**

Modify proposal as follows:

402.8 Interior Finish. Interior wall and ceiling finishes within the mall and, exits~~, and exit passageways~~ shall have a minimum flame spread ~~rating~~ index of Class B per Section 803. Interior floor finishes shall meet the requirements of Section 804.

Committee Reason: Based upon the proponents reason. The modification recognized that exits include exit passageways and that "flame spread index" is more appropriate terminology used throughout the I-Codes than "flame spread rating."

Assembly Action: **None**

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, GBH International, representing the American Fire Safety Council, requests Approval as Modified by this public comment.

Further modify proposal as follows:

402.8 Interior Finish. Interior wall and ceiling finishes within the mall and exits shall have a minimum flame spread index and smoke developed index of Class B per Chapter 8 ~~Section 803~~. Interior floor finishes shall meet the requirements of Section 804.

Commenter's Reason: The original proposal correctly pointed out that there is a need to state clearly the interior finish requirements within a covered mall building. Chapter 8 requires that those interior wall and ceiling finishes that are not considered trim (per Section 806) must meet both a flame spread index (in the case of Class B it would be a flame spread index of between 26 and 75) and a smoke developed index (of no more than 450). With the proposed reorganization of Chapter 8 and the option of using NFPA 286 instead of ASTM E 84 for testing interior finishes, the reference to Chapter 8 is better than the reference to section 803.

Final Action: AS AM AMPC _______ D

G54-06/07
402.9

Proposed Change as Submitted:

Proponent: Sarah A. Rice, Schirmer Engineering Corporation

Revise as follows:

402.9 Smoke control. Where a covered mall building contains an atrium, a smoke control system shall be provided ~~where required for atriums~~ in accordance with Section ~~404~~ 404.4.

Exception: A smoke control system is not required in covered mall buildings, when an atrium connects only two stories.

Reason: The issue is - when does a covered mall building require a smoke control system. As currently written the code has been interpreted as always mandating a smoke control system for any covered mall building regardless of configuration. The reference in Section 402.9 for the code user goes to go to the Atrium Section (404) seems to be easily missed.

While some may see the proposed language as redundant we feel the it clarifies the intent and application of the smoke control provisions as they apply to covered mall buildings. The proposed language does 2 things:

1. Makes it clear that only when a covered mall building has an atrium a smoke control system might be needed. This language will make it clear that a single story covered mall building will never be required to have a smoke control system, as it won't have an atrium, and
2. For those multi-story covered mall buildings, the inclusion of the exception in Section 402.9 (which is mirrored after the exception in 404.4) allows the code user to know that the smoke control requirements are only for covered mall buildings having 3 stories. This seeks to eliminate the confusion that seems to exist when the user is sent to Section 404.

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

Committee Action: **Approved as Submitted**

Committee Reason: Clarifies that smoke control is only required for a covered mall building when it contains an atrium that connects more than 2 stories.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jerry J. Barbera, Port of Seattle Airport Building Department, representing himself, requests Approval as Modified by this public comment.

Replace proposal with the following:

402.9 Smoke control. A smoke control system shall be provided ~~where~~ as required for atriums in Section 404.

Commenter's Reason: The proponent's concern is a valid one and this section has been a problem since the publication of the 2000 IBC. The provisions for smoke control in Atriums in Section 404.4 were modified for the 2003 IBC to clear this up. However, it is still written in a manner to confuse rather than elucidate the intent. The way the proponent of G54-06/07 wrote the fix would have made the Section worse than it is now. A mall is not an atrium and vice-versa as is clearly stated in Section 404.1.1, definition of Atrium, "ATRIUM. An opening connecting two or more stories … and not defined as a mall. …" The way the original proponent crafted it, that distinction would become very confusing as was the differences between Malls and Atriums were in the 2000 IBC.

I believe the way I have corrected the proposal makes it clearer that when a Mall needs a smoke control system, it shall be designed as are the ones that are required for Atriums.

Final Action: AS AM AMPC _______ D

G63-06/07
403.10 (New), 3007 (New), Chapter 35 (New)

Proposed Change as Submitted:

Proponents: Dave Frable, U.S. General Services Administration; Gerry Jones/Herman Brice, Co-Chairs, NIBS/MMC Committee for Translating the NIST World Trade Center Investigation Recommendations into Building Codes

1. Add new text as follows:

403.10 Fire service access elevator. In buildings with an occupied floor more than 120 feet above the lowest level of fire department vehicle access, a minimum of one fire service access elevator shall be provided in accordance with Section 3007.

(Renumber subsequent sections)

SECTION 3007
FIRE SERVICE ACCESS ELEVATOR

3007.1 General. Where required by Section 403.10, every floor of the building shall be served by a fire service access elevator. Except as modified in this section, the fire service access elevator shall be installed in accordance with this chapter and ASME A17.1.

3007.2 Hoistway enclosures protection. The fire service access elevator shall be located in a shaft enclosure complying with Section 707.

3007.3 Fire service access elevator lobby. The fire service access elevator shall have a door opening into a fire service access elevator lobby complying with Sections 3007.3.1 through 3007.3.3.

> **Exception:** Where fire service access elevators have multiple door openings on a floor, additional door openings shall be permitted to open to lobbies protected in accordance with Section 707.14.1.

3007.3.1 Access. The fire service access elevator lobby shall have direct access to a building stair.

3007.3.2 Lobby enclosure. The fire service access elevator lobby enclosure shall have a minimum 1-hour fire resistance rating.

3007.3.3 Lobby fire door assemblies. Each fire service access elevator lobby fire door shall have a fire protection rating of not less than 1 hour and shall be self closing or automatic closing.

3007.4 Standpipe hose connection. Each building exit stair having direct access to the fire service access elevator lobby shall be provided with a standpipe hose connection in accordance with Section 905.

3007.5 Two-way fire department communication system. The fire service access elevator and every associated fire service access elevator lobby shall be provided with an approved two-way fire department communication system. It shall operate between a fire command center complying with Section 911 and the fire service access elevator and every associated fire service access elevator lobby. The two-way fire department communication system shall be designed and installed in accordance with NFPA 72.

> **Exception**: Fire department radio systems where approved by the fire department.

3007.6 Elevator car size. The elevator car size shall be in accordance with Section 3002.4.

3007.7 Elevator system monitoring. Conditions necessary for the continued safe operation of the fire service access elevator shall be continuously monitored at the fire command center by a *Standard Fire Service Interface* system meeting the requirements of NFPA 72 and NEMA SB30.

3007.8 Electrical power. The following features associated with fire service access elevators shall be supplied by both normal power and Type 60/Class 2/Level 1 standby power:

1. Elevator equipment
2. Elevator machine room ventilation and cooling equipment
3. Elevator controller cooling equipment

3007.8.1 Control wiring The normal and standby power control wiring supplying the fire service access elevators shall be protected by construction having a minimum 1 hour fire resistive rating.

3007.9 Standby power. The fire service access elevator shall be provided with standby power in accordance with Sections 2702 and 3003.

3007.10 Elevator machine rooms and machinery spaces. Automatic fire sprinklers shall not be installed in fire service access elevator machine rooms and machinery spaces.

2. Add new standards organization and standard to Chapter 35 as follows:

National Electrical Manufacturer's Association (NEMA)
1300 N. 17th Street
Suite 1847
Rosslyn, VA 22209

SB30-05 Fire Service Annunciator and Interface

Reason: Following the events of September 11, 2001, the U.S. General Services Administration (GSA) undertook a research initiative for the development of performance requirements for the use of elevators for occupant egress and fire service access in buildings. This research initiative is currently being conducted by the National Institute of Standards and Technology (NIST). The proposed code change is a by-product of the research currently being conducted by NIST as well preliminary information provided by a task group of ASME A17.1 for determining the required system features necessary for safe operation by trained firefighters during a fire emergency.

We feel that the requirements included in this proposal provide a reasonable degree of safety for firefighters operating the fire service access elevator to a location for staging firefighters and equipment one or two floors below the fire. The staging location will have access to a stair and standpipe that will allow for firefighting operations to be conducted from just above the staging area.

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

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

Note: The following analysis was not in the Code Change Proposal book but was published in the "Errata to the 2006/2007 Proposed Changes to the International Codes and Analysis of Proposed Referenced Standards" provided at the code development hearings:

Analysis: Review of the proposed new standard indicated that, in the opinion of ICC Staff, the standard did not comply with ICC standards criteria, Section 3.6.2.1 for mandatory language.

Committee Action: Disapproved

Committee Reason: Generally the committee was in favor of the proposal but disapproved the code change based upon a variety of issues that needed to be addressed. For instance there was concern with terminology in proposed section 3007.3.1 which currently references a "building stair" instead of an "exit enclosure." Other concerns related to the standard reference to NEMA SB30 and the size of the elevator lobby.

Assembly Action: Approved as Submitted

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful and public comments were submitted.

Public Comment 1:

Dave Frable, U.S. General Services Administration requests Approval as Modified by this public comment.

1. Modify proposal as follows:

403.10 Fire service access elevator. In buildings with an occupied floor more than 120 feet above the lowest level of fire department vehicle access, a minimum of one fire service access elevator shall be provided in accordance with Section 3007.

(Renumber subsequent sections)

SECTION 3007
FIRE SERVICE ACCESS ELEVATOR

3007.1 General. Where required by Section 403.10, every floor of the building shall be served by a fire service access elevator. Except as modified in this section, the fire service access elevator shall be installed in accordance with this chapter and ASME A17.1.

3007.2 Hoistway enclosures protection. The fire service access elevator shall be located in a shaft enclosure complying with Section 707.

3007.3 Fire service access elevator lobby. The fire service access elevator shall ~~have a door opening~~ open into a fire service access elevator lobby ~~complying~~ in accordance with Sections 3007.3.1 through 3007.3.3.

> **Exception:** Where a fire service access elevator~~s have multiple~~ has two entrances ~~door openings~~ onto a floor, the second ~~additional~~ entrance ~~door openings~~ shall be permitted to open into an elevator lobby ~~lobbies protected~~ in accordance with Section 707.14.1.

3007.3.1 Access. The fire service access elevator lobby shall have direct access to an exit enclosure ~~building stair.~~

3007.3.2 Lobby enclosure. The fire service access elevator lobby ~~enclosure~~ shall be enclosed with a smoke barrier having ~~have~~ a minimum 1-hour fire resistance rating, except that lobby doorways shall comply with Section 3007.3.3.

> **Exception:** Enclosed fire service access elevator lobbies are not required at the street floor.

3007.3.3 Lobby ~~fire door assemblies~~ doorways. Each fire service access elevator lobby ~~fire door~~ shall ~~have a fire protection rating of not less than 1-hour and shall be self closing or automatic closing~~ be provided with a doorway that is protected with a ¾ hour fire door assembly complying with Section 715.4.

3007.4 Standpipe hose connection. ~~Each building exit stair having direct access to the fire service access elevator lobby shall be provided with a~~ A Class I standpipe hose connection in accordance with Section 905 shall be provided in the exit enclosure having direct access from the fire service access elevator lobby.

~~**3007.5 Two-way fire department communication system.** The fire service access elevator and every associated fire service access elevator lobby shall be provided with an approved two-way fire department communication system. It shall operate between a fire command center complying with Section 911 and the fire service access elevator and every associated fire service access elevator lobby. The two-way fire department communication system shall be designed and installed in accordance with NFPA 72.~~

> ~~**Exception**: Fire department radio systems where approved by the fire department.~~

~~**3007.6 Elevator car size.** The elevator car size shall be in accordance with Section 3002.4.~~

3007.7 Elevator system monitoring. The ~~Conditions necessary for the continued safe operation of the~~ fire service access elevator shall be continuously monitored at the fire command center by a *Standard ~~Fire~~ Emergency Service Interface* system meeting the requirements of NFPA 72 ~~and NEMA SB30~~.

3007.8 Electrical power. The following features ~~associated with~~ serving each fire service access elevator~~s~~ shall be supplied by both normal power and Type 60/Class 2/Level 1 standby power:

1. Elevator equipment
2. Elevator machine room ventilation and cooling equipment
3. Elevator controller cooling equipment

3007.8.1 Protection of wiring or cables ~~Control wiring~~. ~~The normal and standby power control wiring supplying the fire service access elevators shall be protected by construction having a minimum 1 hour fire resistive rating.~~ Wires or cables that provide normal and standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation, and fire detecting systems to fire service access elevators shall be protected by construction having a minimum 1 hour fire resistance rating or shall be circuit integrity cable having a minimum 1 hour fire resistance rating.

~~**3007.9 Standby power**. The fire service access elevator shall be provided with standby power in accordance with Sections 2702 and 3003~~.

~~**3007.10 Elevator machine rooms and machinery spaces.** Automatic fire sprinklers shall not be installed in fire service access elevator machine rooms and machinery spaces.~~

2. Revise as follows:

903.3.1.1 NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Section 903.3.1.1.1.

903.3.1.1.1 Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance rated construction or contains electrical equipment.

1. Any room where the application of water, or flame and water, constitutes a serious life or fire hazard.
2. Any room or space where sprinklers are considered undesirable because of the nature of the contents, when approved by the fire code official.

3. Generator and transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a fire-resistance rating of not less than 2 hours.
4. In rooms or areas that are of noncombustible construction with wholly noncombustible contents.
5. <u>In fire service access elevator machine rooms and machinery spaces.</u>

Commenter's Reason: As the proponent of the original code change proposal, I submit this comment to support the successful Assembly Action in Lake Buena Vista that recommended approval of this code change. The proposed code change is a by-product of research currently being conducted by the National Institute of Standards and Technology (NIST) and funded by the U.S. General Services Administration. Overall, the General Code Committee stated they were in favor of the code change proposal but disapproved the code change proposal based on a number of issues. The purpose of this modified code change is to address the issues raised by the General Code Committee.

1. **3007.3 Fire service access elevator lobby.** This paragraph was revised for clarification purposes only. The exception also clarifies that if the fire service access elevator has two entrances, the second entrance is permitted to open into an enclosed or otherwise protected elevator lobby in accordance with 707.14.1.
2. **3007.3.1 Access.** This paragraph was revised for clarification purposes only. This change addresses the concerns of the Code Committee regarding the term "building stair".
3. **3007.3.2 Lobby enclosure.** This paragraph was revised for clarification purposes only. This change addresses concerns that this paragraph was non-specific with regard to the enclosure requirements for the lobby. A smoke barrier is the appropriate reference since it is designed to resist fire and smoke spread and is intended to create an area of refuge. The new exception addresses the need for not requiring an enclosed lobby on the street floor.
4. **3007.3.3 Lobby doorways.** The title and content of this paragraph was revised for clarification purposes only. A horizontal separation is allowed to be protected with a ¾ hour fire door assembly. Clearly a ¾ hour fire rated door provides more protection then a 20 minute fire door typically required by a smoke barrier.
5. **3007.4 Standpipe hose connection.** This paragraph was revised for clarification purposes only. It was felt that since 905.4 is limited to "required" exit stairways; this paragraph will still require a standpipe hose connection in non-required or additional exit stairways.
6. **3007.5 Two-way fire department communication system.** This paragraph was deleted since it is redundant and currently covered in the IBC.
7. **3007.6 Elevator car size.** This paragraph was deleted since it is redundant and currently covered in the IBC.
8. **3007.7 Elevator system monitoring**. This paragraph was revised to delete superfluous text, correct the title of the interface system, and to delete the reference to NEMA SB30.
9. **3007.8 Electrical power**. This paragraph was revised for clarification purposes only.
10. **3007.8.1 Protection of wiring or cables.** The title and content of this paragraph was revised for clarification purposes only.
11. **3007.9 Standby power**. This paragraph was deleted since it is redundant and currently covered in the IBC.
12. **3007.10 Elevator machine rooms and machinery spaces.** This paragraph was relocated to Chapter 9 based on a recommendation from the General Code Committee. See new exemption number 5, 903.3.1.1.1.

903.3.1.1.1 Exempt locations (new exemption 5). Added new exemption number 5. Relocated material from 3007.10. Provides an exemption for providing automatic sprinklers in fire service access elevator machine rooms and machinery spaces. The need for providing sprinkler protection in these areas is questionable based on the lack of fire loss statistics for elevator machine room and machinery space fires and the concerns from ASME regarding disconnecting the main power line to the affected elevators prior to the application of water from the sprinklers.

Public Comment 2:

Paul K. Heilstedt, PE, Chair, ICC Code Technology Committee (CTC), requests Approval as Modified by this public comment.

Modify proposal as follows:

3007.7 Elevator system monitoring. Conditions necessary for the continued safe operation of the fire service access elevator shall be continuously monitored at the fire command center by a *Standard Fire Service Interface* system meeting the requirements of NFPA 72 ~~and NEMA SB30~~.

(Portions of proposal not shown remain unchanged)

Commenter's reason: This proposal was disapproved by the committee, noting that that there were concerns due to some of the terminology and the reference to a proposed standard that does not meet ICC standard's criteria. It is further noted that this proposal gained the support of the assembled body in Orlando as evidenced by the successful assembly action.

This public comment addresses the issue of the non-compliant standard by deleting the proposed standard. This standard is not needed for purposes of the monitoring of the elevator system as the provisions of Section 7.10 of NFPA 72 include standard fire service interface provisions. Further, while the committee notes that some of the language is in need of possible clarification, this concept is very relevant and important in terms of fire fighting operations and occupant egress safety. The concept of a fire service elevator in tall buildings (more than 120 feet) is long overdue to be considered in the building code.

Public Comment 3:

Tim Pate, City and County of Broomfield, Colorado, representing himself requests Approval as Modified by this public comment.

Modify proposal as follows:

3007.3.1 Access. The fire service access elevator lobby shall have direct access to a ~~building stair~~ exit enclosure .

(Portions of proposal not shown remain unchanged)

Commenter's Reason: It was pointed out during testimony from the Committee that the building stair does not have any specific requirements to actually extend to the exit discharge. This modification would require the elevator lobby to have direct access to a vertical exit enclosure which of course leads to the exit discharge.

Final Action: AS AM AMPC _______ D

G68-06/07

403.15 (New), Table 403.15 (New)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

Add new text as follows:

403.15 Spray-Applied Fire Resistive Materials (SFRM). The bond strength of the SFRM shall be in accordance with Table 403.15.

TABLE 403.15
MINIMUM BOND STRENGTH

HEIGHT OF BUILDING	SFRM MINIMUM BOND STRENGTH
More than 75 feet[a] and up to 420 feet	430 psf
More than 420 feet	1,000 psf

a. Above the lowest level of fire department vehicle access

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this proposal is to increase the required adhesions of Spray Applied Fire Resistant Materials (SFRM).

The National Institute of Standards and Technology's (NIST) investigation into the World Trade Center (WTC) tragedy documented that the proximate cause of the actual collapse was the action of a building contents fire on light steel members in the absence of spray applied fire resistant material, which had been dislodged. Events far less dramatic than an airplane attack have been known to dislodge SFRM. The initiating events can be as simple as elevator movement, building sway or maintenance activities.

Recommendation 6 of the NIST WTC Report calls for improvement of the in-place performance of SFRM. This proposal is one of three that seeks to achieve that objective. The other two are a proposal for a new Section 714.8 dealing with the application of SFRM and a strengthened Section 1704.10 dealing with special inspections of SRFM installations.

The current code specifies a SFRM bond strength of 150 psf when tested in accordance with ASTM E736, no matter how large the building or how high the risk. This proposal requires the use of higher bond strength material for buildings over 75 feet in height and yet again higher strength for those that exceed 420 feet. These higher standards are warranted by the higher risk associated with taller buildings. Products that meet this standard are available in the marketplace.

Bond strength is not the only material characteristic that affects in-place durability. Density does as well. This proposal does not establish a separate density standard because density and bond strength are linked to one another. High bond strength entails high density.

Some might argue that more research is needed to establish appropriate bond strengths for different levels of risk. The proponents agree but believe something needs to be done now to improve the in-place durability of SFRM. This code provision will have that result. It should be recognized as a beginning, not an end.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

Cost Impact: The code change proposal will increase the cost of construction but only marginally so. Many tall buildings already utilize these higher strength materials.

Committee Action: **Approved as Modified**

Modify the proposal as follows:

403.15 ~~Spray-Applied~~ Sprayed Fire Resistive Materials (SFRM). The bond strength of the SFRM shall be in accordance with Table 403.15.

TABLE 403.15
MINIMUM BOND STRENGTH

HEIGHT OF BUILDING [a]	SFRM MINIMUM BOND STRENGTH
More than 75 feet[a] and up to 420 feet	430 psf
More than 420 feet	1,000 psf

a. Above the lowest level of fire department vehicle access

Committee Reason: Although the data which provides technical support was not provided within the proposal, this does go along with the NIST recommendations and should provide better safety in high-rise buildings. Using the greater bond strengths will increase the probability that the protection will stay in place and will reduce the likelihood of being dislodged. These factors should provide for a longer time of safety. Placing the requirements in the high-rise provisions of Chapter 4 instead of within Chapter 7 makes sense because they are only applicable to high-rises and will be more likely to be found within that section. The committee did agree with the different bond strength requirements based upon the thought the taller buildings are at a higher risk and that items such as the vibration of tall buildings will affect the long term performance. Based on testimony which was provided, the cost impact of this requirement was considered as being relatively small. The higher density products which are currently available will generally meet these requirements. The modifications included a revision of the terminology "spray applied" to "sprayed" to be consistent with the action of FS156-06/07 and to create a more global point of reference for building height by moving footnote a to the main title of the first column.

Analysis: Note Section 403.3.1 item 1 states "420 feet (128 m) in height," relating to building height as defined in Section 502.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Dave Frable, U.S. General Services Administration/Public Buildings Service requests Disapproval.

Commenter's Reason: As stated in the Committee's reason, no technical data has been provided by the proponent to justify increasing the current IBC requirements for the minimum bond strength for SFRM in high-rise buildings. In addition, the proponent has not provided a logical explanation which clearly shows why the current Code provisions regarding the minimum bond strength for SFRM in high-rise buildings is inadequate and how the subject proposal will improve the code.

It is also our belief that the single most common reason for SFRM dislodgement during construction is the intentional removal of SFRM by trades for the purpose of attaching certain installations to the steel frame. We do not see how Increasing the density or bond strength will resolve this issue. In addition, to our knowledge, there also has been no evidence submitted by the proponent to document the claim that building sway dislodges SFRM. Last but not least, it has come to our attention that there may have been misleading testimony regarding the cost impact for installing SFRM if the proposed changes are adopted and we feel that it would be unreasonable to require these higher bond strengths for SFRM in ALL high-rise buildings, without knowing if in fact that it would increase the level of overall safety to the building occupants. Therefore we urge the membership to deny G68-06/07.

Public Comment 2:

Lawrence G. Perry, representing BOMA International requests Disapproval.

Commenter's Reason: Nothing in Recommendation 6 of the NIST WTC report points towards a need for a 186% (for buildings 75 feet to 420 feet in height) to 567% (for buildings greater than 420 feet in height) increase in the bond strength of SFRM. The NIST recommendations recommend improved criteria and testing methodology, improved inspection procedures (both during construction and after), criteria for determining effective uniform thickness, methods for predicting effectiveness of SFRM, and methods for predicting service life performance. Separate code change proposals have addressed the issues related to ensuring that SFRM materials are properly applied. There is no technical substantiation for arbitrarily increasing the bond strength requirements.

During public testimony on this code change, the proponents failed, even after being specifically questions from the committee, to provide any explanation as to the cost implications of this change. Also, as noted in the committee statement, "the data which provides technical support was not provided within the proposal".

A likely unintended result of this code change will be consideration and use of alternatives to SFRM. A quick online search finds numerous gypsum board assemblies that will provide a 2-hour or 3-hour fire resistance rating. These alternate assemblies have no performance requirements similar to that proposed for SFRM. The NIST recommendations fail to address this, even though the report notes that gypsum enclosures were used on core columns in the towers (See NIST report, page 73).

Public Comment 3:

Robert J. Wills, American Iron and Steel Institute requests Disapproval.

Commenter's Reason: AISI urges the membership to vote for disapproval of G68-06/07. The proponent for G68 listed the following reasons in support of the original proposal:

- The collapse of World Trade Center (WTC) was caused by the action of building contents fire on light steel members in the absence of SFRM, which had been dislodged. Recommendation 6 of NIST WTC report calls for the improvement of in-place performance of SFRM.

- Events such as elevator movement, building sway or maintenance activities have been known to dislodge SFRM.
- Currently specified minimum SFRM bond strength of 150 psf is not sufficient for higher buildings with higher risks.
- Something needs to be done now to improve the in-place durability of SFRM, although more research is needed to establish appropriate bond strength for different levels of risk.
- The proposal will increase the cost of construction only marginally.

The General Committee's recommendation of approval as modified cited the following justification:

- The proposal goes along with the NIST recommendations and should provide for better safety in high-rise buildings, although no technical data was provided to support the proposal.
- Greater bond strength will increase the probability that the protection will stay in place and will reduce the likelihood of SFRM being dislodged. This should provide for a longer time of safety.
- Taller buildings are at a higher risk; vibration of tall buildings will affect the long-term performance.
- The cost impact was considered as being relatively small, based on provided testimony.

AISI did not testify on G68-06/07 in Orlando. The performance of SFRM in high-rise buildings is an important and sensitive issue. AISI wanted to hear the testimony and take time to properly evaluate the claims of the proponent as well as the reasons cited by the committee. During the last few months AISI worked with the Steel Solution Center of the American Institute of Steel Construction to quantify some of the issues being addressed by G68. This collaboration resulted in a report that analyzed the relevant NIST WTC recommendations, reviewed bond strengths for commonly available SFRM products, and informally surveyed architects to investigate their findings relative to SFRM dislodgement in real projects. In addition, the study attempted to quantify the cost implications of G68 using several building project sizes. This study is available for review and has been submitted as part of the substantiation for this public comment.

In summary, the study reached the following conclusions relative to the justification for G68:

- Nothing in NIST Recommendation 6 or any other part of NIST WTC investigation recommends or justifies the proposed changes for increased SFRM bond strength or SFRM density. NIST clearly points to aircraft impacts as the primary cause of tower collapse. The SFRM bond strength or density did not play a significant role in the tragic events, and nothing suggests that medium- or high-density SFRM would have changed the sequence of events on that day. The NIST report specifically confirms the "mostly intact" condition of SFRM in WTC towers prior to aircraft impacts, although the SFRM was applied to primed/painted steel in WTC, and priming/paint are known to reduce bond strength of SFRM.
- Standard-density SFRM products have reliably served their purpose in high-rises over many decades, and there is nothing to suggest that the currently specified minimum bond strength of 150 psf is inadequate for higher buildings. Increased fire resistance and other stringent regulations already address higher risks associated with taller buildings, and there has been no evidence submitted to suggest that SFRM bond strength or density played any significant role in any high-rise building fire incident in the U.S. The proposal G68 creates an artificial technical barrier specifically calibrated and targeted to ban standard-density SFRM products from the high-rise market – it does not address any measurable risks or safety concerns tied to meaningful bond strength values.
- The single most common reason for SFRM dislodgement during construction is the intentional removal of SFRM by electrical, mechanical and other trades for the purpose of attaching certain installations to the steel frame. This issue can only be addressed by adequate inspections and required replacement of SFRM dislodged during construction. Arbitrarily increasing density or bond strength does not resolve the issue of intentional removal of SFRM.
- There has been no evidence submitted to document the claim that building sway dislodges SFRM. Maintenance activities in certain building spaces, such as elevator shafts, mechanical rooms, and other utility and storage spaces are known to dislodge SFRM from unconcealed steel members in close proximity to human or machinery traffic – these concerns are already addressed by the SFRM industry practices. Medium- and high-density SFRM products are recommended for protection of unconcealed steel members subject to traffic impact and abrasion, whether in high-rise or low-rise buildings. If these industry practices need to be codified, then a more focused proposal should be considered that addresses these specific areas of concern. However, the overwhelming majority of SFRM in buildings is concealed or beyond the reach for the effects of human or machinery traffic – there is absolutely no reason to apply blanket increased bond strength or density requirements for the entire building.
- Flawed testimony was offered with regard to the cost impact of proposal G68. In fact, credible estimates for real projects suggest very significant cost increase for installed SFRM if the proposed changes are adopted. Based on AISI's analysis, for buildings over 75', G68 will increase the installed SFRM cost by at least 50%. In cases where G68 would effectively result in the use of high-density SFRM instead of standard-density products, the installed SFRM cost would increase by at least 200%. These increases cannot be characterized as "marginal" or "relatively small" and the economic impact needs to be fully considered. G68 will result in millions of wasted dollars that could be spent in a smarter way. There is absolutely nothing to suggest that this proposed change, if adopted, would save a single life or a single dollar in fire losses over the foreseeable future.

AISI supports cost effective code changes that will improve the real world performance of SFRM. We share the desire to take action that will respond to the events of September 11. Unfortunately, we believe that G68 promises more than it can deliver and it has economic implications that are not cost effective. AISI is willing to work with proponents to produce code requirements that effectively allocate society's fire protection resources in meaningful ways. We urge the membership to overturn the committee recommendation and vote for disapproval of G68-06/07.

Substantiation: "Analysis of Proposed Change G68-06/07 to the 2006 Edition of the IBC", Farid Alfawakhiri, Ph.D., American Iron and Steel Institute, January 2007. Document located at the following link. http://www.steel.org/g68/g68.pdf

Final Action: AS AM AMPC _______ D

G69-06/07

403.15 (New), 403.2 (New)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

Add new text as follows:

<u>**403.15 Structural performance.** Buildings that are more than 420 feet (128 m) in height shall be designed to survive a building contents fire to burnout without more than local failure of the structural frame. The building contents fire shall be analyzed in accordance with the *International Performance Code for Buildings and Facilities* and shall be based on a design fire without sprinkler activation approved by the authority having jurisdiction. The design fire shall take into consideration the following: fuel loading; peak heat release rate(s); amount of air available; and confinement of the fire(s). Minimum fire load densities for each specific occupancy within a building shall be based upon approved fire engineering guidelines and shall take into account appropriate safety factors. In a mixed used building, the appropriate fire load for each portion of the building based on the occupancy classification for that space shall be applied. The fire resistance rating of the structural frame shall not be less than the fire resistance ratings prescribed in Table 601.</u>

<u>**403.2 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.</u>

<u>**LOCAL FAILURE.** A failure of the area of floor at any story at risk of collapse that does not exceed 15% of the floor area of that story or 750 square feet, whichever is smaller, or does not extend further than the immediate adjacent story.</u>

<u>**STRUCTURAL FRAME.** The columns and the girders, beams, trusses, and spandrels having direct connections to the columns and bracing members designed to carry gravity loads as described in footnote "a" of Table 601.</u>

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this change is to establish a specific performance objective: that very tall buildings (those over 420 feet in height) be analyzed to ensure that they will survive a building contents fire without collapse. The change is intended to implement Recommendations of the National Institute of Standards and Technology's (NIST) World Trade Center (WTC) report.

The proponents believe that it needs to be understood that this proposal is not intended to make buildings immune to a massive assault such as that which took place in the World Trade Center (WTC) tragedy. It is intended to prudently increase the robustness of structural fire protection by ensuring that factors not considered by the Code's current prescriptive approach are taken into account where risk is very high because the building is very tall. Risk is a combination of probability and consequence. The probability of the scenario contemplated by this proposal, a full contents burnout, in the absence of working sprinkler protection is very low but the consequences of the collapse of a very tall building can be cataclysmic. Accordingly, risk is significant and additional analysis is warranted.

A recent NIST study documented 22 cases of fire induced building collapses (15 if the WTC and Pentagon events are excluded) involving buildings greater than four stories in height. The possibility clearly exists. There are many possible causes of fires in buildings. The WTC tragedy adds another to the list – a mindful and technically sophisticated attempt to bring a very tall building down using carefully set fires. The terrorist threat alone may not warrant additional code considerations but when taken together with existing hazards and the human and economic consequences of the collapse of a very tall building, the proponents believe additional code provisions are warranted. It should be noted that the NIST report documents that the immediate cause of the WTC collapse was structural weakening induced by a contents fire which occurred at locations remote from the initial damage.

The Code has long protected building structure against fire hazards through a prescriptive system of fire ratings based upon the testing of specific assemblies. The fire rating of the structural frame required by Table 601 is intended to prevent collapse. The problem with this system is that it is largely empirical and does not have a strong theoretical basis. We know that it seems to work, and work well, although not without exception.

More importantly, the systems we have do not consider the interplay between the specific design of structural members and fire resistance protection. The NIST WTC report, for example, documents that the rating obtained for protected steel members varies by length. A steel member that has a two (2) hour rating when tested at a specific length, say 25 feet, may have a significantly lower rating if the actual installed member is longer than the tested specimen. The current rating system doesn't consider the interplay between individual member characteristics that do affect performance no does it consider the very different characteristics of the fires that the member might be exposed to based on the differing heat release characteristics and the quantity of the varying fire loads that can be anticipated in different buildings.

The NIST WTC report points out that a great deal of research will be required to resolve these issues. The proponents believe that something can and should be done now to address this manifest risk. The proposal is but the first step on a long road, but it is a step that must be taken without delay. The proponents believe the tools exist.

The proposal is a new Section 403.15, which is proposed to be applicable to those high rise buildings that exceed 420 feet in height.

It establishes a performance requirement that the building structure and passive fire protection systems be designed to enable the building to survive a building contents fire to burnout without suffering more than a local collapse of the structural frame. Local collapse is defined within the text. This is the same definition as used in the proponents disproportionate collapse proposal for a new Section 1605.

A performance requirement is only possible if there is a predictable and reputable way to analyze a given building for conformity with that requirement. The proposal references the ICC Performance Code for Building and Facilities as the prescribed method of analysis. The proponents believe that this will be the first mandatory scoping of the Performance Code as the IBC. It will surely not be the last. The Performance Code does not specify the design fire, so the proposal requires that the design fire(s) be based upon approved engineering guidelines. An example would be the ICC's 2005 International Fire Engineering Guidelines in which ICC participated in the development with the publishers, the Australian Building Codes Board, which distill worldwide research and experience with this subject.

The proposal requires the analysis to be performed assuming that a fire suppression system is not working. Obviously, if fire loads are as anticipated and a fire suppression system functions as intended, no building will even approach structural frame collapse. Sprinkler systems are highly reliable. This change depends on that reliability for smaller buildings and requires a "sprinkler out" performance analysis only in very tall buildings when collapse has cataclysmic human and economic consequences. The probability of the "sprinkler out" scenario is low but the potential consequences are very high.

The proposal specifies that the results of this performance analysis shall be used in <u>addition</u> to the requirements of Table 601. Some might argue that this "belt and suspenders" approach is not warranted. The proponents believe that it is. The amount of field experience we have with the ICC Performance Code is not sufficient to permit its use instead of Table 601. The hazard being guarded against here is a building specific combination of structural design and fire risk that might make Table 601 inadequate. The performance analysis will be used to increase fire protection, not reduce it. With time and experience, it might become prudent to substitute a performance analysis for Table 601. The proponents believe that time has not yet come.

Bibliography:
Beitel, Jesse and Nestor Iwankiv, PhD., P.Ej. "Historical Survey of Multistory Building Collapses Due to Fire." <u>Fire Protection Engineering,</u> Number 27.
National Institute of Standards and Technology. <u>Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers.</u> United States Government Printing Office: Washington, D.C. September 2005.
<u>ICC Performance Code for Buildings and Facilities.</u> Country Club Hills, Illinois: International Code Council, 2001.
International Fire Engineering Guidelines. ABCB, Canberra, Australia

Cost Impact: The code change proposal may increase the amount of passive fire protection in very tall buildings and so increase costs. The proponents believe that there will be some increased costs in many very tall buildings, but that costs will be both moderate and warranted when the performance analysis demonstrates a potential weakness.

Committee Action: Disapproved

Committee Reason: This proposal which was intended to better understand the affect of a building contents fire on the structural integrity of a highrise was disapproved. Part of the concerns stemmed from a partial reference to the ICC Performance Code within the IBC. The committee felt it needed to be a broader reference or not referenced at all. There was also concern with the design fire specified and how it would be approved by the authority having jurisdiction.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings, requests Approval as Modified by this public comment.

Modify proposal as follows:

403.15 Structural performance. Buildings that are more than 420 feet (128 m) in height shall be designed to survive a building contents fire to burnout without more than local failure of the structural frame. The building contents fire shall be analyzed in accordance with <u>Section 1701.3.15 of</u> the *International Performance Code for Buildings and Facilities* and shall be based on a design fire without sprinkler activation approved by the authority having jurisdiction. <u>The design fire shall be a quantitative description of assumed design fire characteristics that can reasonably be expected to occur during the life of the building and on which a deterministic fire safety engineering analysis is conducted.</u> The design fire shall take into consideration the following: fuel loading; peak heat release rate(s); amount of air available; and confinement of the fire(s). Minimum fire load densities for each specific occupancy within a building shall be based upon approved fire engineering guidelines and shall take into account appropriate safety factors. In a mixed used building, the appropriate fire load for each portion of the building <u>shall be</u> based on the occupancy classification for that <u>portion</u> ~~space shall be applied~~. The fire resistance rating of the structural frame shall not be less than the fire resistance ratings prescribed in Table 601.

403.2 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.

LOCAL FAILURE. A failure of the area of floor at any story at risk of collapse that does not exceed 15% of the floor area of that story or 750 square feet, whichever is smaller, or does not extend further than the immediate adjacent story.

STRUCTURAL FRAME. The columns and the girders, beams, trusses, and spandrels having direct connections to the columns and bracing members designed to carry gravity loads as described in footnote "a" of Table 601.

Commenter's Reason: In the committee reason for disapproval, it was stated that a "broader reference" to the ICC Performance Code be provided. It would seem that a more specific, rather than broader, reference would be desirable. Therefore, Section 1701.3.15 of the ICC Performance Code entitled, Magnitude of Fire Event, is added to the text. Additionally, the committee was "concerned with the design fire that was specified and how it would be approved by the authority having jurisdiction". There is *no* design fire specified in the proposal. By not specifying the design fire, the engineer may utilize any number of resources for specifying the characteristics of a fire that can reasonably be expected to occur during the life of the building such as: the *SFPE Engineering Guide to Performance-Based Fire Protection* (SFPE), Chapter 8 – Developing Design Fire Scenarios; *Structural Design for Fire Safety* by Andrew Buchanan (Wiley); Chapter 4 Room Fires; Section 4.5 Design Fires; ISO/DTS 16733 "Fire Safety Engineering – Selection of design fire scenarios and design fires" (draft technical standard); Eurocode 1: Actions on structures, Part 1-2: General actions – Actions on structures exposed to fire (EN 1991-1-2:2002); Section 2 Structural fire design procedures.

It needs to be made clear that this new provision is *not* a performance provision. It merely establishes the same safety objective that forms the basis of the current approach to structural fire resistance, only for buildings at high risk due to the consequence of failure. In these buildings it is necessary that the safety objective be demonstrated by calculation rather than by the standard fire resistance test. To clarify that the current prescriptive approach is based on burnout without collapse, here is a brief historical perspective…

As a result of the Baltimore fire of 1904, ASTM organized Committee P on Fireproofing Materials in 1905. In 1917, Committee C-5 (renamed from Committee P) prepared a standard, C 19, (later designated E 119) which was adopted in 1918 as a specification for "Fire Tests of Materials and Construction." This standard introduced the standard time-temperature (furnace heating) curve which has remained essentially unchanged to this day. It is interesting to note that the standard heating curve was developed by consensus and was not based on temperatures achieved during a full burnout (Hall 2004). Ingberg's work at NBS (now NIST), however, led to the empirical relationship between fuel load, fire duration, and structural resistance in units of time (Bukowski 2006) and provided the scientific basis for the time-temperature curve approach to fire safety design. It was generally held that the standard time-temperature curve represented a limiting condition for a ventilation-controlled fire with typical fuel loads and ventilation characteristics of most buildings (Bukowski 2006). The fire safety design objective was that, under the worst case conditions (i.e., no suppression), all of the combustibles in the compartment should be consumed without causing failure of any structural member – that is, burnout without local or global collapse (Bukowski 2006).

When the standard fire curve was introduced in 1918, bay sizes were smaller than they are today, buildings heights were less, materials of construction were different than those used today, and combustibles had different burning characteristics than modern materials. The proposed code change is completely consistent with the *basis* for today's prescriptive approach to fire safety and is intended to insure that, for high-rise buildings – those buildings that pose the highest risk due to the consequence of failure – the basic fire safety design objective of burnout without local or global collapse is achieved.

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Bukowski, Richard W. (2006). "Determining Design Fires for Design-Level and Extreme Events,"SFPE 6th International Conference on Performance-Based Codes and Fire Safety Design Methods, June 14-16, 2006, Tokyo.

Hall, John R. (2004). "A Century of Fire Standards," Standardization News, December 2004, ASTM International, West Conshohocken, Pennsylvania

Final Action: AS AM AMPC _______ D

G70-06/07

403.15 (New)

Proposed Change as Submitted:

Proponent: Jason T. Thompson, National Concrete Masonry Association (NCMA), representing Masonry Alliance for Codes and Standards (MACS)

Add new text as follows:

<u>**403.15 Exit stairway and elevator hoistway shaft enclosure integrity.** For buildings greater than 420 feet in height, exit stairways and elevator hoistways shall be enclosed with fire barriers tested in accordance with ASTM E119 with the hose stream test conducted at the end of the fire-resistance test to determine structural integrity.</u>

Reason: This proposed code change basically establishes an enhanced structural integrity requirement for elevator shaft hoistway and exit stairway enclosures in what we call super high rise buildings, i.e. those buildings greater than 420 feet in height. The basis for the enhanced structural integrity performance is the option to conduct the hose stream test in the ASTM E119 fire resistance test at the end of the entire fire test. This method for conducting the hose stream test is based on Section 11.3 of that standard. The hose stream option under Section 11.3 specifies that the hose stream test be applied at the end of the fire resistance test. In the case of these shaft enclosures regulated by the high rise building requirements of the International Building Code (IBC), that would occur at the end of the 2 hour fire resistance test. Passing this test would indicate an enhanced structural integrity of these shaft enclosures as compared to walls tested using the standard hose stream test which is conducted after a duplicate specimen has been fire tested for one half the fire resistance rating period (not to exceed 1 hour) after which the hose stream test is then applied as specified in Section 11.2 of ASTM E119.

Final recommendations from the NIST World Trade Center fire and collapse investigation suggest that there is a need to provide minimum structural integrity for the means of egress including the stairwells and the elevator shafts that may be used for emergency access by emergency responders, as well as a secondary method for emergency evacuation. Key findings of the NIST Final Report of the National Construction Safety Team on the Collapse of the World Trade Center Towers can be found on the NIST website at www.nist.gov. Chapter 9 Recommendation 18 indicates the following:

> "NIST recommends that egress systems (i.e., stairs, elevators, exits) should be designed… (2) to maintain their functional integrity and survivability under foreseeable building-specific or large-scale emergencies…"
>
> Item b in this recommendation further states: "The design, functional integrity, and survivability of the egress and other life safety systems, (e.g., stairwell and elevator shafts…) should be enhanced by considering accidental structural loads such as those induced by overpressures (e.g., gas explosions), impacts, or major hurricanes and earthquakes, in addition to fire separation requirements… The stairwells and elevator shafts… should have adequate structural integrity to withstand accidental structural loads and anticipated risks."

Shaft enclosures provided for exit stairways and elevator hoistways should be designed to be as robust as possible in order to withstand the dynamic effects of an out of control fire. Unfortunately, the E119 fire endurance test by itself does not replicate the types of physical insults a wall may suffer during a fire. The fire test furnace is a rather static environment in which the test wall is exposed to natural gas burner flames (that don't even impinge on the wall) under a slightly negative pressure differential, whereas real fire situations are normally very dynamic and occur under positive pressure conditions within compartments of buildings. Because the fire test furnace does not replicate real fires, it was determined that some type of physical stress test was needed as part of the ASTM E119 test method. The hose stream test was determined to be the most appropriate method for evaluating the relative robustness, i.e. strength, integrity, and impact resistance, of fire resistance rated wall assemblies. In fact, Section 11.1 of the E119 Test Method states that "The hose stream test shall be conducted to subject the specimen…to the impact, erosion, and cooling effects of a hose stream." Also, the Appendix X5. Commentary Section X5.9 Integrity states: "In this hose stream test, the ability of the construction to resist disintegration under adverse conditions is examined."

Not only are actual fire hose streams employed by fire fighters during their activities on the fire scene, but there are other impacts and stresses that may be imposed on walls such as:

Falling debris including ceilings and fixtures
Collapsing shelving and storage racks
Thermal expansion of the wall
Differential movement between the wall and the supporting floor and restraining walls and floor/roof above
Explosions
Liquid pool fires or similar fire exposures that can result from burning plastics, which have a rapid temperature rise and more severe upper layer gas temperatures
Projectiles such as aerosol cans, pressurized gas cylinders, and other pressure sealed containers

The hose stream test is an attempt to address some of the dynamics of a real fire scenario since it applies stresses, including orthogonal loading to the wall assembly, immediately after the fire endurance test has been completed and the wall is weakest. Because the use of fire resistance wall varies, the ASTM E119 test method includes 3 options for applying the hose stream test as follows:

1. No hose stream test is required for walls that have a fire resistance rating of less than one hour. (Section 11.1.1)
2. The hose stream test is applied to a duplicate wall assembly which is fire tested for one-half the fire resistance rating period of the original wall assembly, but not to exceed one hour. (Section 11.2) Thus, walls having a fire resistance rating greater than 2 hours need only be retested for one hour for the application of the hose stream test.
3. The hose stream test may be applied at the end of the fire test. (Section 11.3)

We believe that this proposal which invokes the third option is an appropriate performance provision for assuring an enhanced robustness and integrity of the shaft enclosures for exit stairways and elevator hoistways in super high-rise buildings. That is because, generally speaking, walls of solid construction with adequate thickness, such as concrete and masonry walls, can readily pass the hose stream test when it is applied at the end of the fire endurance test. However, most framed walls which are designed to just meet the fire resistance ratings required by the code generally can not. Those walls are accommodated by Option 2 for the hose stream test as indicated above.

We believe the structural integrity issue goes beyond the problems associated with the stairway shaft enclosures and elevator hoistway shaft enclosures in the World Trade Center tragedies. This is especially critical since the NIST report has estimated that the fire department response using stairs to gain access to the 58th floor of a hypothetical 60 story building to effect fire fighting operations and rescue would require at least 90 minutes if the fire department personnel did not carry any equipment or breathing apparatus and as much as 125 minutes if they were carrying equipment and breathing apparatus. Furthermore, it has been estimated that the evacuation of a fully occupied World Trade Center Tower would take approximately 4 hours. Thus, it is critical that not only do the shaft enclosures resist fire exposure for the specified 2 hours but they demonstrate adequate structural integrity to be able to withstand the dynamics of a fire condition involved in an uncontrolled fire in a building.

Providing this additional level of physical performance for shaft enclosures of exit stairways and elevator hoistways in super high-rise buildings is essential for life safety. These super high-rise buildings will likely require staged evacuations necessitating that the exit stairways and elevator shaft enclosures remain in place for very extended periods of time during a fire. The hose stream test proposed in this code change proposal will help to provide that additional factor of safety.

Staged evacuations become necessary in super high-rise buildings because of the extremely high occupant loads which make total evacuation impractical within a reasonable period of time. An example of the very high occupant loads that can occur in super high-rise buildings follows. Take a typical office building having a floor plate of 10,000 sq. ft. per floor. The resultant calculated occupant load for each floor is 100 based on Table 1004.1.2 which specifies that business areas (offices) have an occupant load of 100 gross sq. ft. per occupant. A 420 foot tall building having a story height of approximately 13 feet per story would contain approximately 32 stories. Thus, the total occupant load of the building would be equal to 100 occupants per story times 32 stories which is 3,200 occupants. This the equivalent of a small community. This is further exacerbated if there is an assembly occupancy located on the top of the building which would not be unusual. In that case, the occupant load can be significantly higher. For example, take the same typical office building and locate a 7,500 net sq. ft. restaurant in the top story. Based on an occupant load of 15 sq. ft. net per occupant, there would be 500 more occupants (15% more) added to the occupant load calculated above which could be even more if the restaurant contained a bar area as well. This would result in a total occupant load of 3,700 people.

Along with the high occupant loads comes a large number of mobility impaired occupants. These occupants can constitute as much as 10% or more of the total occupant load depending upon the use of the building. For the typical example we cited above, this means there could be as many as 320 mobility impaired occupants in the office portion of the building and 50 in the restaurant portion for a total of 370 mobility impaired occupants. Obviously, this large number of mobility impaired occupants will increase the evacuation time and put greater pressure on the rescue operations of the responding fire department, requiring additional resources and time to assist those mobility impaired occupants in evacuating the building or moving to a suitable area of refuge within the building. Thus, it is critical that the shaft enclosures provided for the exit stairways and elevator hoistways be able to withstand the effects of an out of control fire in a super high-rise building.

In conclusion, we believe that this code change will provide an important enhancement to the level of fire and life safety provided in buildings greater than 420 feet in height by mandating that the shaft enclosures for the exit stairways and elevator hoistways in those buildings be more resistant to the dynamic forces that occur during an uncontrolled fire by requiring such walls to have their fire resistance rating determined in accordance with ASTM E119 with the application of the hose stream test conducted at the end of the fire resistance rating period for the fire endurance test in that test method.

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

Committee Action: Disapproved

Committee Reason: The committee did not feel that the proposal accomplished what was desired to create the “robust” stair enclosure that was discussed in the NIST report. This proposal does not establish the force levels that the enclosure is required to withstand and the hose stream test is not a reasonable comparison to the forces anticipated in a terror-resistant building. As written the proposal is not clear whether the hose stream test is conducted at the end of the completed fire test or if it is conducted on the duplicate sample which is tested at the end of one-half of the desired fire-resistance rating. Currently published test reports do not specify when the hose stream test was conducted, they simply indicate that the assembly passed the test. Therefore this proposal would require retesting of assemblies if the original test data is not available. The proposal was also viewed as limiting to certain materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jason T. Thompson, National Concrete Masonry Association (NCMA), representing Masonry Alliance for Codes and Standards (MACS), requests Approval as Modified by this public comment.

Modify proposal as follows:

403.15 Exit stairway and elevator hoistway shaft enclosure integrity. For buildings greater than 420 feet in height, exit stairways and elevator hoistways shall be enclosed with fire barriers tested in accordance with ASTM E119 with the hose stream test conducted at the end of the fire-resistance test <u>for the original test specimen</u> to determine <u>the</u> structural integrity <u>of the fire barrier</u>.

Commenter’s Reason: The Masonry Alliance for Codes and Standards (MACS) believes it is time for the International Building Code (IBC) to respond to one of the more critical recommendations made in the NIST Final Report of the National Construction Safety Team on the Collapse of the World Trade Center Towers. This particular code change proposal specifically addresses the need to “harden” the exit stairway and elevator hoistway shaft enclosures to provide additional structural integrity beyond that presently provided for in the code. To address one of the concerns the Committee expressed for disapproving this code change proposal, we have clarified the code change by proposing a modification as indicated in this Public Comment to clearly state that the hose stream test is to be applied at the end of the fire-resistance test of the original test specimen. In other words, if the shaft enclosure wall is required to have a 2-hour fire-resistance rating, the hose stream test is to be applied immediately after the 2-hour fire-resistance test has been performed rather than on a duplicate test specimen as permitted by ASTM E119. The duplicate test specimen in E119 is only exposed to the fire-resistance test for one-half the duration (1-hour) and then exposed to the hose stream test. When a test specimen is exposed to the hose stream test at the end of the entire fire-resistance test for the desired fire-resistance rating, the wall is obviously at its weakest point and is most vulnerable to the application of an exterior force such as a hose stream. Thus, the hose stream test provides a very challenging assessment of the overall structural integrity of the wall’s ability to “resist disintegration under adverse conditions.”

An alternate approach to address this issue for exit stairway enclosures in these super high-rise buildings (those greater than 420 feet in height) has been proposed by the ICC Ad Hoc Committee on Terrorism Resistant Buildings in code change proposal G73-06/07. That proposal provided a structural load test to evaluate the overall structural integrity of the exit stairway enclosure walls. It was recommended for disapproval by the IBC Structural Code Development Committee because of concerns about the features of the load test. We believe that this code change proposal as modified by this Public Comment is a suitable method for determining the structural integrity of these shaft enclosure walls. More importantly, the test results and information are already available as all walls having a fire-resistance rating of 1 hour or greater must be tested to the hose stream test. Thus, the test report for every wall so tested will indicate which option of the hose stream test was used to qualify the wall. In that regard, the IBC Fire Safety Code Development Committee is incorrect in part of their reason statement given for disapproving this code change proposal as submitted. The test reports for fire-resistance rated wall assemblies do specify when the hose stream test was conducted. So it would not be necessary to require retesting of these wall assemblies. It is only the listings for the various wall assemblies that do not indicate how the hose stream test was conducted. However, that can be readily resolved by the listing agencies evaluating or reviewing the existing test reports they prepared and then revising the listing to indicate when the hose stream test was applied. This is a small cost in relation to the benefit of determining if shaft enclosure walls used for exit stairways and elevator shafts in super high-rise buildings will maintain a reasonable degree of structural integrity under adverse fire conditions. It is not necessary to “reinvent the wheel” in order to reference when the hose stream test is to be applied to determine adequate structural integrity of shaft enclosure walls in super high-rise buildings. The code user can simply rely on existing fire test reports to clearly identify those walls that meet this proposed criteria for structural integrity.

In conclusion, we believe it is time to move forward with the NIST World Trade Center recommendations by overturning the Committee’s recommendation for disapproval and approving this code change proposal as modified by this Public Comment.

Final Action: AS AM AMPC _______ D

G71-06/07
403.15 (New), 1019.1 (IFC [B] 1019.1)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

1. Add new text as follows:

403.15 Additional exit stairway. For buildings other than Group R-2 that are more than 420 feet (128 m) in height, one additional exit stairway meeting the requirements of Sections 1009 and 1020 shall be provided in addition to the minimum number of exits required by Section 1019.1. The total width of any combination of remaining stairways with one stairway removed shall not be less than the total width required by Section 1005.1. Scissor stairs shall not be considered the additional exit stair required by this section.

2. Revise as follows:

1019.1 Minimum number of exits. All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits required by Table 1019.1 based on the occupant load of the story, except as modified in Sections 403.15, 1015.1 or 1019.2. For the purposes of this chapter, occupied roofs shall be provided with exits as required for stories. The required number of exits from any story, basement or individual space shall be maintained until arrival at grade or the public way.

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

This proposed change is intended to enable rapid full evacuation of very tall buildings by ensuring that ongoing and critical firefighting activity does not reduce the total required exit capacity needed to evacuate the remaining occupants of the building. It implements, in part, Recommendation 17 of the National Institute of Standards and Technology (NIST) World Trade Center (WTC) report.

The basic purpose behind the Code's current egress provisions for very tall buildings is to evacuate several floors near the fire floor. The provisions do not contemplate prompt full building evacuation. The NIST WTC report calls for Codes to consider that criterion. It is important to note that the need for full evacuation may be the result of a terrorist event, but that a range of other natural occurrences or man-made failures might also necessitate full building evacuation.

If the need for a full building evacuation occurs because of or at the same time as a fire then there will be very real problems. Necessary firefighting operations will reduce the capacity of the egress system. The extended period of time needed to fully evacuate a very tall building means that people will still be evacuating while full firefighting operations are taking place. Sound high rise fire fighting doctrine provides that the fire department take control of one stair, the one most appropriate to the circumstances of the given fire condition, in order to conduct suppression activities. In a building having two required stairs, each of the same width, this means that one-half of the exit capacity has been lost in a building which is still being evacuated.

This proposal calls for an additional stair so that egress capacity will be maintained through the time that full evacuation is complete. It is important to note that this additional stair is not proposed to be a dedicated fire department stair. The intent of the proposed provision is that the fire department be able to choose the stair which is most appropriate for the actual fire event. The principal purpose of this change is to maintain egress capacity in the case of fire events, but the additional stair will also significantly shorten the time needed for full evacuation in non-fire events.

The proponents recognize that effective use of this feature will require emergency responders to manage evacuation flow to the available stairs. The proponents have submitted proposed changes to Articles 4, 7, and 9 of the IBC that will assist in that management. It should be pointed out, however, that this management problem exists under current code provisions; it is just magnified by the loss of egress capacity for full building evacuation.

The issue of "counter flow" has been much discussed since the WTC tragedy --counter flow meaning the fire fighters going up interfere with occupants moving down. The NIST report suggests that counter flow did not slow evacuation rates, but it did affect firefighter ascent rates. Some have suggested that widening the minimum width of stairs will resolve the counter flow problem.

The proponents disagree and believe that dedicating a stair to the fire service while maintaining necessary egress capacity in the remaining stairs is a better solution. There is a practical limit to how rapidly occupants can descend, no matter how wide the stair. Whether minimum width should be expanded because the practical limit cannot be obtained at the current minimum is a different code issue than the one addressed here. The proponents have not seen data or analysis which suggest that additional minimum width is needed, independent of counter flow considerations.

Really rapid evacuation of all occupants, but especially those with disabilities, depends upon the development of robust and safe evacuation elevators. That is the long term solution. The elevator industry and the ASME A-117.1 Committee are working hard on this important challenge but a lot of work remains to be done. The proponents recognize that evacuation elevators might one day eliminate the need for the extra stair proposed here, but believe that something must be done now to address this very real problem.

The proposal adds a new Section 403.15 which requires one more stair than is otherwise required by Section 1019.1. It requires that the stair meet the minimum width requirements of Section 1009.1. More importantly, it also requires that the additional stair and the two (or more) stairs required by Section 1019.1 be sized, in terms of width, such that any combination of all stairs, less one, will provide for the required total width required by Section 1009.1. This meets the intent of the change that the required egress width be available even with one stair being used for firefighting operations.

It is important to note that the proposal does not require the additional stair to be located in accordance with other applicable requirements such as travel distance and separation. Those provisions of the Code will be met by the other stairs. The proponents believe that those requirements might be very difficult to meet with the additional stair and are not needed given the intent of the change.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

Cost Impact: The code change proposal will increase the cost of construction for very tall buildings.

Committee Action: **Disapproved**

Committee Reason: The committee felt that review of the NIST report was not yet complete, therefore this proposal was premature. Modeling should be done to show the extent that an additional stair would improve exiting. The logistics of closing off a stairway for fire department staging during an emergency evacuation must be investigated. The calculation method for exit stairway width was confusing, and did not clearly indicate the width required for the extra stairway. The location of the extra stairway in relation to the other exit stairways was not indicated. In a high rise, fire fighters will typically be using the elevator to get near the fire floor and then move to the stairway. A question would be if this stairway should be located near the elevators.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings, requests Approval as Submitted.

Commenter's Reason: The Code Development Committee disapproved this change for several reasons. The first was that the "NIST report was not yet complete and the proposal was premature". The NIST report is complete and this proposal addresses Recommendation 17 of the report. The committee also felt that modeling should be done to show the impact of the additional stair. Modeling has been performed by NIST. This model demonstrates that the additional stair improves occupant egress and fire fighter access in all cases. The degree to which the access is improved is directly related to the location of the fire in the building. The committee was also confused with the manner in which the minimum width of the stair is calculated. The code change requires that required egress capacity for the building be determined with one stairway removed from the equation. The committee was also concerned with the lack of guidance regarding the location of the stair. The location of the additional stair is irrelevant. The fire service will commandeer the stair that is closest to the fire location; this code change merely assures that sufficient egress capacity is provided when the fire service does so. It also provides unimpeded access to the fire floor for the fire service. It is for these reasons that the TRB Ad-Hoc Committee requests your support for As Submitted.

Final Action: AS AM AMPC _______ D

G72-06/07
403.15 (New)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

Add new text as follows:

<u>**403.15 Remoteness of exit stairway enclosures.** Exit stairway enclosures shall be located in different structural bays. The nearest wall of separate required exit stairway enclosures shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the nearest portion of the stairway enclosure. In buildings with three or more exit stairway enclosures, the exit stairway enclosures shall be placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the nearest portion of the exit stairway enclosure. Scissor stairs shall be counted as one exit stairway.</u>

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this change is to add a new Section 403.15 that will require stair shafts to meet remoteness criteria, in addition to the separation distance requirements for exit access doorways of Section 1015.2.

The Code has long contained requirements designed to ensure that all the exit access doors on a floor are not grouped closely together. Grouping exit access doors too closely defeats the whole point of multiple exits.

The National Institute of Standards and Technology's (NIST) report on the World Trade Center (WTC) tragedy recommends a new remoteness criterion for stair shafts (Recommendation 18). The report pointed out that, at some locations, stairs that met the exit access distance requirements were, nonetheless, very closely grouped. Their shafts were very close together and all three were destroyed by the airplane impact, thereby dooming all above. It is not the proponents' intent to make stair shafts immune to airplane attacks but the re-examination of our basic criteria that was prompted by the attack and the WTC Report suggests that far less dramatic events could render more than one stair shaft unusable. The cause need not be an act of terror either. There are other explosive hazards in high rise buildings. It is only prudent to separate the stair shafts themselves as well as the exit access doors.

It is possible that, in some high rise office buildings, this provision will result in one or more stairs being across the hall from the core rather than in the core. No additional floor area will be required for the sum total of core and stairs. If a stair is outside the traditional core, then the core itself will be smaller. Some might suggest that such a stair location might inhibit design flexibility in tenant spaces. This is simply not true. The architect might have to work a little harder to develop layouts but, with a little skill, any constraint can be incorporated into an acceptable design.

The proposal actually introduces two remoteness criteria. The first is a traditional standard based upon diagonal distances. The second requires that two stairs not be located in the same bay. This requirement correlates with two other changes submitted by the proponents. The proposed disproportionate collapse provisions of the proposed new Section 1605 and the proposed burnout without excessive collapse provisions of proposed new Section 403.15 both work to limit the extent of collapse. The structural bay aspect of this proposal is intended to exclude the possibility that two shafts might be in the same collapse zone.

The proposal requires the nearest points of two stair enclosures to be separated by a distance exceeding one-half the maximum overall diagonal dimension (one third in the case of buildings having three or more required stairs). The proposal also requires that multiple stair shafts not be located in the same bay for the reasons described above.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

Cost Impact: The code change proposal will not increase construction costs. It merely deals with the location of building elements that are already required by the Code.

Committee Action: Disapproved

Committee Reason: The committee felt that review of the NIST report was not yet complete, therefore this proposal was premature. The term 'structural bay' was not defined. The standard 'structural bay' is not used in high rise construction. Justification was not provided for the significant change for the additional separation of exits, especially if the additional stairway in G71 is also required. The ½ of the diagonal dimension, in a standard plan with 3 or more stairways, would force the stairway enclosure out of the building footprint. An analysis of the architectural and engineering impact of this change must be performed.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings, requests Approval as Modified by this public comment.

Modify proposal as follows:

403.15 Remoteness of exit stairway enclosures. ~~Exit stairway enclosures shall be located in different structural bays.~~ The nearest wall of separate required exit stairway enclosures shall be placed a distance apart equal to not less than one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the nearest portion of the stairway enclosure. In buildings with three or more exit stairway enclosures, at least two of the exit stairway enclosures shall be placed a distance apart equal to not less than ~~one-third~~ one-half of the length of the maximum overall diagonal dimension of the building or area to be served measured in a straight line between the nearest portion of the exit stairway enclosure. Scissor stairs shall be counted as one exit stairway.

Commenter's Reason: In the 2006 Report of the Public Hearing, it was stated that the committee disapproved this proposal for several reasons. This public comment satisfies these concerns. Firstly, the committee could not support the change because the term "structural bay" is not defined. This public comment deletes this requirement. Additionally, the committee felt that "in a standard plan with 3 or more stairways, this would force the stair enclosure out of the building footprint". To reduce the impact on buildings with three exits, this public comment eliminates the requirement for all exits to be remote and merely contains a requirement similar to Section 1015.2.2 and requires two of the exits to be remote.

Final Action: AS AM AMPC _______ D

G73-06/07
403.15 (New)

Proposed Change as Submitted:

Proponent: William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings

Add new text as follows:

<u>**403.15 Structural integrity of exit stairway enclosures.** For all buildings that are more than 420 feet (128 m) in height, exit stairway enclosure wall surfaces, from the top of the floor to the underside of the floor or roof above and connections to supporting members, shall be capable of resisting a static load expressed as a uniform pressure of not less than 2 pounds per square inch (psi) applied perpendicular to the exterior of the enclosure. This load need not be assumed to act concurrently with the loads specified in Chapter 16.</u>

Reason: This code change proposal is one of fourteen proposals being submitted by the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings.

The purpose of this change is to establish a standard for the structural robustness of exit stairway enclosures. It implements Recommendation 18 of the National Institute of Standards and Technology (NIST) report on the World Trade Center (WTC) tragedy.

The Code has traditionally looked upon a stair enclosure as a place of relative safety. There are any number of carefully crafted code provisions designed to ensure that goal, but they are based upon only one hazard – fire. The enclosures of these stairs are made fire resistive through the traditional rating and listing system, but the Code does not establish a criterion for structural robustness. The proponents do not believe that the existing "hose stream" test addresses this issue. The hose stream does not and cannot represent the real world impact of blast loads that a stair shaft might encounter. Neither does the ongoing industry work designed to develop an impact resistance test standard. That work relates to durability rather than safety. The proponents believe that a structural standard is needed.

The stair enclosures of the WTC were destroyed by an aircraft impact. Far lesser events, such as a gas explosion or a vehicle impact (on lower floors) can destroy a stair enclosure, especially when one considers that the Code contains no structural criteria at all. Any structural robustness that existing stair shaft enclosures have is a by-product of the fire rating process; a process that was never intended to provide structural integrity.

A new criterion is needed for exit stair enclosures – a structural one.

The NIST WTC Report suggests a standard based upon resistance to over-pressure. This approach has two real advantages. It reflects one possible damage scenario and can represent others as well. Secondly, it is a performance standard. All materials can be analyzed and engineered to comply.

Compliance with this standard is determined by engineering analysis, not a test. This is a simple and direct approach that can be implemented immediately.

The requirement is expressed as a simple static load of 2 psi acting perpendicular to the shaft. The criterion is very similar to that already established for guardrails. It is expressed in the same way as the existing guardrail structural requirement so that the manner in which it is to be applied is clear. The proponents believe that traditional forms of enclosure, such as 8" full mortar bedded and reinforced CMU walls, will meet the requirement. There is no question that less traditional and more lightweight systems can be designed to meet it as well.

Bibliography: National Institute of Standards and Technology. Final Report of the National Construction Safety Team on the Collapses of the World Trade Center Towers. United States Government Printing Office: Washington, D.C. September 2005.

Cost Impact: The code change proposal will increase the cost of construction but the continued absence of structural criteria for exit stairway enclosures is not possible. This is a cost that must be met for safety's sake.

Committee Action: Disapproved

Committee Reason: Based upon considerable testimony in opposition, indicating that there are many problems with the proposal that need resolution. There is no explanation given that justifies the proposed 2 psi loading on the walls of stair enclosures. It should be clarified whether that load is considered a strength or service level load. Why does the load apply only to the walls and not the supporting floors? This loading would result in much stiffer enclosure walls, that would be treated as shear walls since they can't be isolated which in turn would adversely impact the design of some seismic force resisting systems.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Dept. of Community Affairs, Division of Codes and Standards, representing the International Code Council Ad Hoc Committee on Terrorism Resistant Buildings, requests Approval as Modified by this public comment.

Modify proposal as follows:

403.15 Structural integrity of exit stairway enclosures. For all buildings that are more than 420 feet (128 m) in height, exit stairway enclosure wall surfaces, from the top of ~~the~~ each floor to the underside of the floor or roof above and connections to supporting members, shall be capable of resisting a ~~static~~ stress design load expressed as a uniform pressure of not less than 2 pounds per square inch (psi) applied perpendicular to the exterior of the enclosure. This load need not be assumed to act concurrently with the loads specified in Chapter 16 and shall be applied to one floor at a time.

Commenter's Reason: The committee disapproved this proposal for several reasons. One reason was that no justification was provided for the 2 psi load. The 2 psi load requirement is consistent with the overpressure associated with a gas explosion*.* NIST has performed an analysis to verify this statement. Additionally, the committee suggested that it be made clear whether this load is a strength load or a service load. This public comment modifies the proposal to make clear that this load is a stress design load. This public comment also clarifies that the load is applied to each floor, however, the load is applied one floor level at a time.

Final Action: AS AM AMPC _______ D

G74-06/07, Part I
IBC 403.15 (New), [F] 909.2 (IFC 909.2)

Proposed Change as Submitted:

Proponent: Tony Crimi, A.C., Consulting Solutions Inc., representing International Firestop Council

PART I – IBC GENERAL

1. Add new text as follows:

403.15 Stair pressurization. Every required interior exit stairway serving floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall comply with the relevant provisions of Sections 909.20 and 1020.1.7, and shall be pressurized to a minimum of 0.15 inch of water (37 Pa) and a maximum of 0.35 inch of water (87 Pa) in the shaft relative to the building measured with all stairway doors closed under maximum anticipated stack pressures.

2. Revise as follows:

[F] 909.2 General design requirements. Buildings, structures or parts thereof required by this code to have a smoke control system or systems, or a stair pressurization system shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

Reason: To introduce Code language which would require Stair pressurization for all high rise buildings with required interior stairwells serving floors over 75 ft, and introduce performance requirements for the protection of pressurized supply air duct systems.

Stair pressurization to provide uncontaminated air within required interior exit stairwells in high-rise buildings should be required in all cases, regardless of whether the building is sprinklered or not. In order to ensure the continuity of fresh air supply, air ducts to the interior stairwells need to be protected from the effect of fire, or constructed as fire resistant systems.

Smoke control systems have been required in nearly two thirds of the United States for over a decade. Conversely, the IBC does not require stairwell pressurization in high-rise buildings, and only requires smoke control in underground buildings, atriums, and covered mall buildings. Section 403.13 of the 2006 IBC requires Smokeproof exit enclosures for high-rise buildings in every required stairway serving floors more than 75 feet (22.86 m) above the ground. Section 909.20.5 permits sprinklered Buildings to use stairwell pressurization as an alternate to the smokeproof enclosures. As a first step, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization results in airflows of high velocity in the gaps around closed doors and construction cracks, thereby preventing smoke from flowing back into the pressurized space through these openings. Pressurized stairwells are provided with the goal of maintaining a tenable environment within the escape routes in the event of a building fire.

Smoke can behave very differently in tall buildings than in low buildings. The predominant factors that cause smoke movement in tall buildings are stack effects, the affect of external wind forces, and forced air movement within the building. Smoke removal and venting practices are complicated by stack effects, which will tend to favour natural air movement vertically through the building as a results of differences in temperature and densities between the inside and outside air. [1]

During the final hearing for the 2003 IBC, the majority of the voting membership voted to support engineered smoke control in high-rise buildings, narrowly missing the two thirds majority required to overturn the committee's recommendation for disapproval. Clearly, many building officials recognize the obvious problem with tall buildings and the challenge of controlling smoke. This proposal seeks to introduce Stairwell pressurization in every required stairway serving floors more than 75 feet (22.86 m) above the ground using the existing design requirements of Section 909 of the IBC.

Several incidents in North America during the past 40 years have demonstrated that serious fires can occur in modern high-rise buildings, that these fires can generate tremendous quantities of smoke, and that smoke can spread rapidly throughout these buildings. Most notable were the 1970 One New York Plaza fire, the1973 Hyatt Regency O'Hare Hotel fire, the 1980 MGM Grand Hotel in Las Vegas, a 1981 fire in North York Ontario at the Inn on the Park Hotel, the 1983 First Canadian Place in Toronto, Ontario, One Meridian Plaza, Philadelphia, Pennsylvania and the First Interstate Bank in Los Angeles, California in the 1990's.

More recently, the NIST Reports on the World Trade Center disaster discuss various aspects of the post impact condition of the exit stairwell. The NYC Building Code did not require stairwell pressurization in sprinklered buildings. However, the *NIST NCSTAR 1-7, WTC Investigation Report* contains the following quotations and comments:

"A survivor from a floor in the 20s in WTC 1: "The stairwell was lit the entire way down. There was a grayish color smoke which smelled like fuel. The more we reached the lower floors the stronger the smell became. On the 6th floor, the sprinklers were on, which slowed us down because we wanted to be cautious and not slip or fall." Interview 1000044 (NIST 2004)"[2]

"The explosion significantly damaged floors, walls, and doorways in subgrade levels and forced large amounts of smoke well away from the immediate area. In one report, visibility was reduced to 0.3 m (1 ft) within about 1 min at the 44th floor of WTC 1, largely through the spread of smoke in elevator and stairwell shafts (Isner and Klem 1993b). Before beginning evacuation, many occupants experienced smoke on occupied floors and encountered even heavier smoke as they descended the buildings in the stairwells." [2]

This proposed Code change also introduces language into the IBC to address systems used for covering and protection of these pressurization HVAC air ducts. The text is similar to the language that had previously been used for grease duct enclosures assemblies in the IMC. In November of 2005, ICC-ES approved the publication of AC 179, <u>Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies</u>, which can be used to evaluate products used for these applications. The purpose of the acceptance criteria is to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, as alternatives to shaft enclosures for vertical ducts with required fire-resistance-rated shafts under specified conditions, with limitations on their application. The criteria also provide an alternate to fire dampers in horizontal ducts (penetrating fire barriers, fire partitions, and or smoke barriers) and vertical ducts connecting not more than two stories.

AC 179 evaluates the enclosure materials and the HVAC duct enclosure systems using the following test methods: Flame spread, smoulder resistance, a fire engulfment test based on ISO 6944 with a through-penetration fire stop, durability tests, and thermal conductivity. Work is currently underway on the development of an ASTM Consensus Standard for this application, but until such time as that process is complete, the proposed language incorporated here will provide a means of evaluating the performance of these products and systems, which are becoming more widespread in their use, while not restricting the choice of acceptable solutions available to designers.

High-rise buildings constructed to the requirements of International Building Code, but without any specific measures to control smoke migration, are all the more vulnerable to property damage and occupants' loss of life. In reality, all the available research indicates that the need for smoke control is more pressing in tall buildings that in any other type of construction. As a minimum, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings.

Bibliography:

[1.] Klote, J.H. and Milke, J.A. Fire Protection Handbook, NFPA 19th Edition, Volume II, Smoke Movement in Buildings, Chapter 6, Section 12-113 – 12-126

[2] NIST NCSTAR 1-7 (Draft), Federal Building and Fire Safety Investigation of the World Trade Center Disaster Occupant Behavior, Egress, and Emergency Communications (Draft)

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

Analysis. While Section 909.2 is typically the purview of the Fire Code Development Committees, for consistency, the General Committee will make the determination for Part I of this proposal.

Committee Action: Disapproved

Committee Reason: An option for either the use of a smoke proof enclosure (natural or mechanical) or pressurization is already located in existing Section 403.13. Requiring the use of pressurization would eliminate the ability to use natural ventilation as allowed in Section 909.20 in smoke proof enclosures.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C., Consulting Solutions Inc., representing International Firestop Council, requests Approval as Modified by this public comment for Part I.

Replace proposal with the following:

<u>**403.15 Stair pressurization.** Every required interior exit stairway serving floors more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall comply with the relevant provisions of Sections 909.20 and 1020.1.7, and shall be pressurized to a minimum of 0.15 inch of water (37 Pa) and a maximum of 0.35 inch of water (87 Pa) in the shaft relative to the building measured with all stairway doors closed under maximum anticipated stack pressures.</u>

[F] 909.2 General design requirements. Buildings, structures or parts thereof required by this code to have a smoke control system or systems<u>, or a stair pressurization system</u> shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

1020.1.7 Smokeproof enclosures. In buildings required to comply with Section ~~403 or~~ 405, each of the exits of a building that serves stories where the floor surface is ~~located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access or~~ more than 30 feet (9144 mm) below the level of exit discharge serving such floor levels shall be a smokeproof enclosure or pressurized stairway in accordance with Section 909.20. In buildings required to comply with Section 403, each of the exits of a building that serves stories where the floor surface is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access serving such floor levels shall be a smokeproof enclosure and pressurized stairway in accordance with Section 909.20.

Commenter's Reason: This proposal would require Stair pressurization for all high rise buildings with required interior stairwells serving floors over 75 ft, and introduce performance requirements for the protection of pressurized supply air duct systems. Smoke control systems have been required in nearly two thirds of the United States for over a decade. This proposed Code change also introduces language into the IBC to address systems used for covering and protection of these pressurization HVAC air ducts.

High-rise buildings constructed to the requirements of International Building Code, but without any specific measures to control smoke migration, are all the more vulnerable to property damage and occupants' loss of life. In reality, all the available research indicates that the need for smoke control is more pressing in tall buildings that in any other type of construction. As a minimum, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization results in airflows of high velocity in the gaps around closed doors and construction cracks, thereby preventing smoke from flowing back into the pressurized space through these openings. Pressurized stairwells are provided with the goal of maintaining a tenable environment within the escape routes in the event of a building fire.

During the Hearings in Orlando last September, the Committee indicated the option to use stairwell pressurization exists. However, the IBC does not require stairwell pressurization in high-rise buildings, and only requires smoke control in underground buildings, atriums, and covered mall buildings. Section 403.13 of the 2006 IBC requires Smokeproof exit enclosures for high-rise buildings in every required stairway serving floors more than 75 feet (22.86 m) above the ground. Section 909.20.5 merely permits sprinklered Buildings to use stairwell pressurization as an alternate to the smokeproof enclosures. Stair pressurization to provide uncontaminated air within required interior exit stairwells in high-rise buildings should be required in all cases, regardless of whether the building is sprinklered or not. In order to ensure the continuity of fresh air supply, air ducts to the interior stairwells need to be protected from the effect of fire, or constructed as fire resistant systems.

Smoke can behave very differently in tall buildings than in low buildings. The predominant factors that cause smoke movement in tall buildings are stack effects, the affect of external wind forces, and forced air movement within the building. Smoke removal and venting practices are complicated by stack effects, which will tend to favour natural air movement vertically through the building as a results of differences in temperature and densities between the inside and outside air. [1]

In regards to the Committees comment about the use natural ventilation, this option is only available where openings in exterior stairwells can be accommodated. Even then, a number of problems have been identified with this approach. Firstly, the required volume of fresh air is high. Secondly, natural supply and exhaust through vents may be subject to adverse exterior wind conditions, and even when functioning satisfactorily, would generally require vents located on different exterior walls. Thirdly, the performance of natural vents is influenced by building stack effects, which may be particularly significant on the upper or lowermost stories for tall buildings. This effect can range from either strong inflow or strong outflow from all natural vents on a given storey. [2]

This proposed Code change also introduces needed language into the IBC to address systems used for covering and providing fire protection of these pressurization HVAC air ducts. Because a national consensus Standard is still under development at ASTM, the text of this proposal uses similar language to that which had previously been used for grease duct enclosures assemblies in the IMC. Similarly, the requirement for the "T" rating already exists for grease duct enclosures in the IMC under IMC section 506.3.10.

In November of 2005, ICC-ES approved the publication of AC 179, Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies, which can be used to evaluate products used for these applications. The purpose of the acceptance criteria is to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, as alternatives to shaft enclosures for vertical ducts with required fire-resistance-rated shafts under specified conditions, with limitations on their application. The criteria also provide an alternate to fire dampers in horizontal ducts (penetrating fire barriers, fire partitions, and or smoke barriers) and vertical ducts connecting not more than two stories. AC 179 evaluates the enclosure materials and the HVAC duct enclosure systems using the following test methods: Flame spread, smoulder resistance, a fire engulfment test based on ISO 6944 with a through-penetration fire stop, durability tests, and thermal conductivity.

Several incidents in North America during the past 40 years have demonstrated that serious fires can occur in modern high-rise buildings, that these fires can generate tremendous quantities of smoke, and that smoke can spread rapidly throughout these buildings. Most notable were the 1970 One New York Plaza fire, the1973 Hyatt Regency O'Hare Hotel fire, the 1980 MGM Grand Hotel in Las Vegas, a 1981 fire in North York Ontario at the Inn on the Park Hotel, the 1983 First Canadian Place in Toronto, Ontario, One Meridian Plaza, Philadelphia, Pennsylvania and the First Interstate Bank in Los Angeles, California in the 1990's.

More recently, the NIST Reports on the World Trade Center disaster discuss various aspects of the post impact condition of the exit stairwell. The NYC Building Code did not require stairwell pressurization in sprinklered buildings. However, the *NIST NCSTAR 1-7, WTC Investigation Report* contains the following quotations and comments:

"A survivor from a floor in the 20s in WTC 1: "The stairwell was lit the entire way down. There was a grayish color smoke which smelled like fuel. The more we reached the lower floors the stronger the smell became. On the 6th floor, the sprinklers were on, which slowed us down because we wanted to be cautious and not slip or fall." Interview 1000044 (NIST 2004)"[3]

"The explosion significantly damaged floors, walls, and doorways in subgrade levels and forced large amounts of smoke well away from the immediate area. In one report, visibility was reduced to 0.3 m (1 ft) within about 1 min at the 44th floor of WTC 1, largely through the spread of smoke in elevator and stairwell shafts (Isner and Klem 1993b). Before beginning evacuation, many occupants experienced smoke on occupied floors and encountered even heavier smoke as they descended the buildings in the stairwells." [3]

The IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization prevents smoke from flowing back into the pressurized exit stairwells and smokeproof enclosures. The goal of this proposal is maintaining a tenable environment within the escape routes in the event of a building fire.

Bibliography:

[1.] Klote, J.H. and Milke, J.A. Fire Protection Handbook, NFPA 19th Edition, Volume II, Smoke Movement in Buildings, Chapter 6, Section 12-113 – 12-126

[2.] Building Research Establishment, UK, Smoke Ventilation of Common Access Areas of Flats & Maisonettes (BD2410), Final Factual Report, Appendix A (Review), BRE Ltd, 2005

[3.] NIST NCSTAR 1-7 (Draft), Federal Building and Fire Safety Investigation of the World Trade Center Disaster Occupant Behavior, Egress, and Emergency Communications (Draft)

Final Action: AS AM AMPC _______ D

G74-06/07 Part II
909.20.2.1(New), 909.20.2.2 (New)

Proposed Change as Submitted:

Proponent: Tony Crimi, A.C., Consulting Solutions Inc., representing International Firestop Council

PART II – IBC FIRE SAFETY

Add new text as follows:

909.20.2.1 Stair pressurization ducts. Ducts used to supply uncontaminated air for pressurized interior exit stairways required by Section 403 shall be a classified and labeled materials, systems, methods of construction, or products specifically evaluated for such purpose, in accordance with nationally recognized standards for such fire resistive enclosure systems.

909.20.2.2 Stair pressurization duct penetrations. Penetrations by stairwell pressurization ducts through a ceiling, wall or floor from the inlet terminal to the outlet terminals shall be protected in accordance with Section 712 with a through-penetration fire stop system having an F and T rating equal to the fire-resistance rating of the assembly being penetrated.

Reason: To introduce Code language which would require Stair pressurization for all high rise buildings with required interior stairwells serving floors over 75 ft, and introduce performance requirements for the protection of pressurized supply air duct systems.

Stair pressurization to provide uncontaminated air within required interior exit stairwells in high-rise buildings should be required in all cases, regardless of whether the building is sprinklered or not. In order to ensure the continuity of fresh air supply, air ducts to the interior stairwells need to be protected from the effect of fire, or constructed as fire resistant systems.

Smoke control systems have been required in nearly two thirds of the United States for over a decade. Conversely, the IBC does not require stairwell pressurization in high-rise buildings, and only requires smoke control in underground buildings, atriums, and covered mall buildings. Section 403.13 of the 2006 IBC requires Smokeproof exit enclosures for high-rise buildings in every required stairway serving floors more than 75 feet (22.86 m) above the ground. Section 909.20.5 permits sprinklered Buildings to use stairwell pressurization as an alternate to the smokeproof enclosures. As a first step, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization results in airflows of high velocity in the gaps around closed doors and construction cracks, thereby preventing smoke from flowing back into the pressurized space through these openings. Pressurized stairwells are provided with the goal of maintaining a tenable environment within the escape routes in the event of a building fire.

Smoke can behave very differently in tall buildings than in low buildings. The predominant factors that cause smoke movement in tall buildings are stack effects, the affect of external wind forces, and forced air movement within the building. Smoke removal and venting practices are complicated by stack effects, which will tend to favour natural air movement vertically through the building as a results of differences in temperature and densities between the inside and outside air.[1]

During the final hearing for the 2003 IBC, the majority of the voting membership voted to support engineered smoke control in high-rise buildings, narrowly missing the two thirds majority required to overturn the committee's recommendation for disapproval. Clearly, many building officials recognize the obvious problem with tall buildings and the challenge of controlling smoke. This proposal seeks to introduce Stairwell pressurization in every required stairway serving floors more than 75 feet (22.86 m) above the ground using the existing design requirements of Section 909 of the IBC.

Several incidents in North America during the past 40 years have demonstrated that serious fires can occur in modern high-rise buildings, that these fires can generate tremendous quantities of smoke, and that smoke can spread rapidly throughout these buildings. Most notable were the 1970 One New York Plaza fire, the1973 Hyatt Regency O'Hare Hotel fire, the 1980 MGM Grand Hotel in Las Vegas, a 1981 fire in North York Ontario at the Inn on the Park Hotel, the 1983 First Canadian Place in Toronto, Ontario, One Meridian Plaza, Philadelphia, Pennsylvania and the First Interstate Bank in Los Angeles, California in the 1990's.

More recently, the NIST Reports on the World Trade Center disaster discuss various aspects of the post impact condition of the exit stairwell. The NYC Building Code did not require stairwell pressurization in sprinklered buildings. However, the *NIST NCSTAR 1-7, WTC Investigation Report* contains the following quotations and comments:

"A survivor from a floor in the 20s in WTC 1: "The stairwell was lit the entire way down. There was a grayish color smoke which smelled like fuel. The more we reached the lower floors the stronger the smell became. On the 6th floor, the sprinklers were on, which slowed us down because we wanted to be cautious and not slip or fall." Interview 1000044 (NIST 2004)"[2]

"The explosion significantly damaged floors, walls, and doorways in subgrade levels and forced large amounts of smoke well away from the immediate area. In one report, visibility was reduced to 0.3 m (1 ft) within about 1 min at the 44th floor of WTC 1, largely through the spread of smoke in elevator and stairwell shafts (Isner and Klem 1993b). Before beginning evacuation, many occupants experienced smoke on occupied floors and encountered even heavier smoke as they descended the buildings in the stairwells."[2]

This proposed Code change also introduces language into the IBC to address systems used for covering and protection of these pressurization HVAC air ducts. The text is similar to the language that had previously been used for grease duct enclosures assemblies in the IMC. In November of 2005, ICC-ES approved the publication of AC 179, Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies, which can be used to evaluate products used for these applications. The purpose of the acceptance criteria is to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, as alternatives to shaft enclosures for vertical ducts with required fire-resistance-rated shafts under specified conditions, with limitations on their application. The criteria also provide an alternate to fire dampers in horizontal ducts (penetrating fire barriers, fire partitions, and or smoke barriers) and vertical ducts connecting not more than two stories.

AC 179 evaluates the enclosure materials and the HVAC duct enclosure systems using the following test methods: Flame spread, smoulder resistance, a fire engulfment test based on ISO 6944 with a through-penetration fire stop, durability tests, and thermal conductivity. Work is currently underway on the development of an ASTM Consensus Standard for this application, but until such time as that process is complete, the proposed language incorporated here will provide a means of evaluating the performance of these products and systems, which are becoming more widespread in their use, while not restricting the choice of acceptable solutions available to designers.

High-rise buildings constructed to the requirements of International Building Code, but without any specific measures to control smoke migration, are all the more vulnerable to property damage and occupants' loss of life. In reality, all the available research indicates that the need for smoke control is more pressing in tall buildings that in any other type of construction. As a minimum, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings.

Bibliography:

[1.] Klote, J.H. and Milke, J.A. Fire Protection Handbook, NFPA 19th Edition, Volume II, Smoke Movement in Buildings, Chapter 6, Section 12-113 – 12-126

[2] NIST NCSTAR 1-7 (Draft), Federal Building and Fire Safety Investigation of the World Trade Center Disaster Occupant Behavior, Egress, and Emergency Communications (Draft)

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

Analysis. While Section 909.2 is typically the purview of the Fire Code Development Committees, for consistency, the General Committee will make the determination for Part I of this proposal.

Committee Action: Disapproved

Committee Reason: The proposal contains unneeded language and the justification for the added requirements was not considered to be adequate. Specifically, the language in proposed Section 909.20.2.1 which indicates the ducts are to be "classified and labeled materials, systems, methods of construction, or products specifically evaluated for such purpose" does not provide a reference to any standard or means to evaluate the performance. Additionally, the requirements of 909.20.2.2 require a "T" rating which is not applied to other penetrations in the same assembly and is not typically required for a wall assembly**.**

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C., Consulting Solutions Inc., representing International Firestop Council, requests Approval as Submitted for Part II.

Commenter's Reason: This proposal would require Stair pressurization for all high rise buildings with required interior stairwells serving floors over 75 ft, and introduce performance requirements for the protection of pressurized supply air duct systems. Smoke control systems have been required in nearly two thirds of the United States for over a decade. This proposed Code change also introduces language into the IBC to address systems used for covering and protection of these pressurization HVAC air ducts.

Justification: High-rise buildings constructed to the requirements of International Building Code, but without any specific measures to control smoke migration, are all the more vulnerable to property damage and occupants' loss of life. In reality, all the available research indicates that the need for smoke control is more pressing in tall buildings that in any other type of construction. As a minimum, the IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization results in airflows of high velocity in the gaps around closed doors and construction cracks, thereby preventing smoke from flowing back into the pressurized space through these openings. Pressurized stairwells are provided with the goal of maintaining a tenable environment within the escape routes in the event of a building fire.

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In regards to the Committees comment about the use natural ventilation, this option is only available where openings in exterior stairwells can be accommodated. Even then, a number of problems have been identified with this approach. Firstly, the required volume of fresh air is high. Secondly, natural supply and exhaust through vents may be subject to adverse exterior wind conditions, and even when functioning satisfactorily, would generally require vents located on different exterior walls. Thirdly, the performance of natural vents is influenced by building stack effects, which may be particularly significant on the upper or lowermost stories for tall buildings. This effect can range from either strong inflow or strong outflow from all natural vents on a given storey. [2]

This proposed Code change also introduces needed language into the IBC to address systems used for covering and providing fire protection of these pressurization HVAC air ducts. Because a national consensus Standard is still under development at ASTM, the text of this proposal uses similar language to that which had previously been used for grease duct enclosures assemblies in the IMC. Similarly, the requirement for the "T" rating already exists for grease duct enclosures in the IMC under IMC section 506.3.10.

In November of 2005, ICC-ES approved the publication of AC 179, Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies, which can be used to evaluate products used for these applications. The purpose of the acceptance criteria is to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, as alternatives to shaft enclosures for vertical ducts with required fire-resistance-rated shafts under specified conditions, with limitations on their application. The criteria also provide an alternate to fire dampers in horizontal ducts (penetrating fire barriers, fire partitions, and or smoke barriers) and vertical ducts connecting not more than two stories. AC 179 evaluates the enclosure materials and the HVAC duct enclosure systems using the following test methods: Flame spread, smoulder resistance, a fire engulfment test based on ISO 6944 with a through-penetration fire stop, durability tests, and thermal conductivity.

Several incidents in North America during the past 40 years have demonstrated that serious fires can occur in modern high-rise buildings, that these fires can generate tremendous quantities of smoke, and that smoke can spread rapidly throughout these buildings. Most notable were the 1970 One New York Plaza fire, the1973 Hyatt Regency O'Hare Hotel fire, the 1980 MGM Grand Hotel in Las Vegas, a 1981 fire in North York Ontario at the Inn on the Park Hotel, the 1983 First Canadian Place in Toronto, Ontario, One Meridian Plaza, Philadelphia, Pennsylvania and the First Interstate Bank in Los Angeles, California in the 1990's.

More recently, the NIST Reports on the World Trade Center disaster discuss various aspects of the post impact condition of the exit stairwell. The NYC Building Code did not require stairwell pressurization in sprinklered buildings. However, the *NIST NCSTAR 1-7, WTC Investigation Report* contains the following quotations and comments:

"A survivor from a floor in the 20s in WTC 1: "The stairwell was lit the entire way down. There was a grayish color smoke which smelled like fuel. The more we reached the lower floors the stronger the smell became. On the 6th floor, the sprinklers were on, which slowed us down because we wanted to be cautious and not slip or fall." Interview 1000044 (NIST 2004)"[3]

"The explosion significantly damaged floors, walls, and doorways in subgrade levels and forced large amounts of smoke well away from the immediate area. In one report, visibility was reduced to 0.3 m (1 ft) within about 1 min at the 44th floor of WTC 1, largely through the spread of smoke in elevator and stairwell shafts (Isner and Klem 1993b). Before beginning evacuation, many occupants experienced smoke on occupied floors and encountered even heavier smoke as they descended the buildings in the stairwells." [3]

The IBC needs to provide more effective means to prevent smoke from entering critical exit stairwells in high-rise buildings. Pressurization prevents smoke from flowing back into the pressurized exit stairwells and smokeproof enclosures. The goal of this proposal is maintaining a tenable environment within the escape routes in the event of a building fire.

Bibliography:

[1.] Klote, J.H. and Milke, J.A. Fire Protection Handbook, NFPA 19th Edition, Volume II, Smoke Movement in Buildings, Chapter 6, Section 12-113 – 12-126

[2.] Building Research Establishment, UK, Smoke Ventilation of Common Access Areas of Flats & Maisonettes (BD2410), Final Factual Report, Appendix A (Review), BRE Ltd, 2005

[3.] NIST NCSTAR 1-7 (Draft), Federal Building and Fire Safety Investigation of the World Trade Center Disaster
Occupant Behavior, Egress, and Emergency Communications (Draft)

Final Action: AS AM AMPC ________ D

G75-06/07

403.15 (New)

Proposed Change as Submitted:

Proponent: Lorin Neyer, Office of Statewide Health, Planning & Development, State of California

Add new text as follows:

403.15 Smoke management. Each story shall be provided with an approved means to restrict smoke originating from a fire in the story from spreading to any other story in the building utilizing the design criteria in Section 909. The approved means shall be capable of exhausting the smoke to the exterior without recirculating to other stories.

Reason: Our organization believes that smoke management is an essential component of an overall fire protection strategy for protecting against unwanted fires in high-rise buildings. In California we have had the requirement for smoke management/control in high-rises since we first incorporated provisions for high-rise buildings in the 1970s. They have proven to be a very important and useful tool in our fire fighting operations since they have the ability to limit the smoke from an unwanted fire to the story of origin, minimizing its spread to adjacent stories and exit paths. It provides a tool for property protection, as well as for life safety, by preventing smoke exposure to occupants on floors remote from the fire and by containing the smoke so that it does not cause damage which can be very significant, especially to sensitive electronic equipment that is found in many buildings today.

The approach we have taken by proposing this requirement for smoke management is to keep the system simple when we refer to Section 909. Our approach is to provide the performance criteria that simply restricts the smoke from a fire from spreading to any other story in the building using an approved means which is capable of exhausting the smoke to the exterior without having it recirculated to other stories. This was the basic concept behind smoke control requirements in our current legacy model building code, the 1997 ICBO Uniform Building Code (UBC). We believe that if we can contain the smoke to the fire floor of origin, we have a better chance of containing the fire and its impacts, as well as in evacuating the occupants to safe areas of refuge within the building or completely out of the building without having to deal with a panic situation. Our experience has shown that smoke can cause extensive property damage and often requires buildings to be shut down for long periods of time while they are rehabilitated and cleaned to eliminate the smoke damage and the smoke odor.

These systems also help us to mop up the fire scene and release our personnel earlier from the fire ground so that they are available for other emergency calls in our communities. It is often a challenge to deal with smoke in high-rise buildings since we cannot use the traditional methods of ventilating through the roof for obvious reasons. A simple basic smoke management system can provide the fire department with the necessary tools to contain smoke to the floor of origin and eventually exhaust it from the building with minimal man-power required to accomplish the task. This is especially important in today's economic climate in our state where there is not a lot of money available to invest in the fire department and their personnel, so we have to get by with minimal manning to provide the necessary services expected by our citizens. Certainly, a smoke management system is one way we can better accomplish our mission in a way that also provides a higher level of fire and life safety protection to the building and its occupants. Therefore, we encourage the Committee to approve this code change proposal to require a means of smoke management in high-rise buildings.

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

Committee Action: **Disapproved**

Committee Reason: Smoke management as addressed in Section 909 is for initial life safety of occupants during a fire event not for protection of contents or assistance to fire fighters for overhaul activities. Therefore the committee felt that reference to Section 909 was inappropriate and if a smoke exhaust system was desired requirements relevant to such systems would need to be developed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Laura Blaul, Orange County Fire Authority and Lorin Neyer, California Office of Statewide Health, Planning & Development, representing the California Fire Chief's Association, request Approval as Modified by this public comment.

Modify proposal as follows:

403.15 Smoke management. Each story shall be provided with an approved means to restrict smoke originating from a fire in the story from spreading to any other story in the building ~~utilizing the design criteria in Section 909~~. The approved means shall be capable of exhausting the smoke to the exterior without recirculating to other stories**.**

Commenter's Reason: We are submitting this Public Comment to request the ICC voting membership to approve this code change proposal as modified by this Public Comment which responds to the Committee reason for disapproval. We agree with the Committee's reason that the reference to Section 909 is inappropriate for this proposed smoke control measure for high-rise buildings since it is not intended for the initial life safety of the occupants during a fire. Instead it is intended to provide for the protection of contents and the assistance to fire fighters for overhaul activities with an indirect effect of enhancing the overall level of life safety to the occupants and the fire fighters by limiting the spread of smoke to the floor on which the fire originates. However, the code official responsible for reviewing and approving the proposed method of smoke control specified in this proposal could certainly rely upon many of the design criteria, principles, and specifications contained in Section 909 to assure the proper operation, design, and reliability of the system.

We still believe our original Reason statement for this code change proposal is appropriate and adequately substantiates this Public Comment to modify our original code change proposal. Therefore, we sincerely request the ICC voting membership to approve this code change proposal as modified by this Public Comment so the fire service can have a sufficient means for controlling smoke in high-rise buildings.

Final Action: AS AM AMPC _______ D

G77-06/07
405.1

Proposed Change as Submitted:

Proponent: Thomas Kinsman, T.A. Kinsman Consulting Company

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. Grandstands, bleachers, stadiums, arenas and similar facilities.
5. 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.
6. Pumping stations and other similar mechanical spaces where human occupancy involves only intermittent labor relating to maintenance and repair.

Reason: The purpose of this proposal is exempt floor levels containing pumping stations and similar mechanical uses from the requirements of Section 405. The intent of the proposal is to apply this exception to only those pumping stations (water supply, sewage handling, etc.) and other similar mechanical spaces that involve human occupancy only relating maintenance and repairs rather than regular daily use.

The code does not define "human occupancy" found in the charging paragraph. It does define the term "occupiable space" in Section 202 which includes spaces that are used for human labor. Because of its similarity to "human occupancy", this can be, and has been, interpreted broadly to include even labor involving repair and maintenance. Such an interpretation seems beyond the intent of Section 405 given the flavor of the existing exceptions. The safety features required by 405 are overly excessive for such spaces with only intermittent occupancy.

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

Committee Action: **Approved as Submitted**

Committee Reason: Section 405 is intended to address concerns with occupants regularly located underground remote from the level of exit discharge, versus spaces which are subject to occasional maintenance. See also the proponents reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jerry J. Barbera, Port of Seattle Airport Building Department, representing himself, requests Approval as Modified by this public comment.

Further modify proposal 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. Grandstands, bleachers, stadiums, arenas and similar facilities.
5. 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.
6. Pumping stations and other similar mechanical spaces ~~where human occupancy involves only intermittent labor relating to maintenance and repair.~~ intended only for limited periodic use by service or maintenance personal.

Commenter's Reason: I agree with the provision provided by the proponent. It is my belief, however, that we should try to have consistent language between the different codes so that the chance of misunderstanding is lessened. Over the 40+ years I have been involved with codes and standards administration, I have found that exceptions without some common set of terms tend to confuse the users and make a proper application of them very difficult.

I surveyed the provisions of IBC Sections Table 307.1(1)-Footnote k, 907.12, 1109.13, 1502.1, and 1607.11.2.1 all relating to mechanical spaces similar to the proposal and found that the common terms were "maintenance", "repair", "limited", "periodic", "service" and "maintenance personal." Therefore, I edited this proposal using these term giving it some of the consistency with the rest of the IBC.

Final Action: AS AM AMPC _______ D

G83-06/07
407.8(New)

Proposed Change as Submitted:

Proponent: Jay Hall, Virginia Dept. of Housing and Community Development, representing VBCOA, VFPA, DHCD

Add new text as follows:

407.8 Special locking arrangement. Means of egress doors shall be permitted to contain locking devices restricting the means of egress in areas in which the clinical needs of the patients require restraint of movement, where all of the following conditions are met:

1. The locks release upon activation of the fire alarm system or the loss of power.
2. The building is equipped with an approved automatic sprinkler system in accordance with Section 903.3.1.1.
3. A manual release device is provided at a nursing station responsible for the area.
4. A key-operated switch or other manual device is provided adjacent to each door equipped with the locking device. Such switch or other device, when operated, shall result in direct interruption of power to the lock – independent of the control system electronics.
5. All staff shall have keys or other means to unlock the switch or other device on each door provided with the locking device.

Reason: Elopement of occupants with dementia and Alzheimer's is a very serious national problem. Delayed egress locks, even with 30 seconds or up to 2 minute delay, fail to always alert the staff when they maybe performing critical care functions with other patients. With the 5 conditions, patients are provided life safety protection and their well being is protected from elopement from the building.

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

Analysis: Would these provisions be better located in Chapter 10 with a cross reference in Section 407 to these requirements? There are two similar proposals being heard by the Means of Egress Development Committee – Ms. All for revisions to Section 1008.1.8.3 and Mr. Kraft for a new Section 1008.1.8.6.1.

Committee Action: **Disapproved**

Committee Reason: While provisions for this type of situation are needed in the code, the committee had concerns which resulted in a vote for disapproval. The provisions are scoped to Group I-2 occupancy. There are other occupancies that may also need this type of allowance. There was concerns with tying the provisions into the fire alarm pull stations. Residents may soon figure this out and start pulling the fire alarm to open the doors. Item 5 for "all staff" would be difficult to enforce. It is believed that the proponent might have intended this to be limited to "clinical staff" only. There was an assembly action for this item. The concern was that there is a real need to have provision to prevent wandering in some Group I type facilities. The proposal would provide consistency in the type of locking arrangement permitted. See also comments to E48-06/07 and E51-06/07.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This item is on the agenda for individual consideration because an assembly action was successful and public comments were submitted.

Public Comment 1:

Jay Hall, Virginia Dept. of Housing and Community Development, representing VBCOA, VFPA, DHCD requests Approval as Modified by this public comment.

Modify proposal as follows:

407.8 Special locking arrangement. Means of egress doors shall be permitted to contain locking devices restricting the means of egress in areas in which the clinical needs of the patients require restraint of movement, where all of the following conditions are met:

1. The locks release upon activation of the fire alarm system or the loss of power.
2. The building is equipped with an approved automatic sprinkler system in accordance with Section 903.3.1.1.
3. A manual release device is provided at a nursing station responsible for the area.

4. A key-operated switch or other manual device is provided adjacent to each door equipped with the locking device. Such switch or other device, when operated, shall result in direct interruption of power to the lock – independent of the control system electronics.
5. ~~All~~ Clinical staff assigned to the area shall have keys or other means to unlock the switch or other device or each door provided with the locking device.

Commenter's Reason: Elopement of occupants with dementia and Alzheimer's is a very serious national problem. Delayed egress locks, even with 30 seconds or up to 2 minute delay, fail to always alert the staff when they maybe performing critical care functions with other patients. With the 5 conditions, patients are provided life safety protection and their well being is protected from elopement from the building.

Based on committee comments this proposal has been modified to not require all staff in the facility to carry a key to these doors. Only the clinical staff assigned to this area shall carry keys or other means shall be provided.

Public Comment 2:

Gene Boecker, Code Consultants, Inc. requests Disapproval.

Commenter's Reason: The proposal as written would require an electronic solution. While this remains a viable solution for some locations such as an Alzheimer's unit it would not be acceptable for institutions for the many others. Many of the occupants of these types of facilities possess sufficient faculties so that they understand that the activation of the fire alarm will bring release of the door mechanism. For this reason a number of institutions has intentionally made the decision to use a manual-only method for release. Significant numbers of institutions across the country has this mechanical method and have used it on an as needed basis through negotiation with the AHJ. This code change would make that process very difficult.

If this is an appropriate solution, it must be applied only to those institutions that are under tight control or where the occupants are incapable of understanding the "freedom option."

To pose one example of problems with this code change would be that institutions for the criminally insane would be allowed to have the "patients" released as soon as they determine how to activate the fire alarm – which will not be difficult since all such institutions must have smoke detection and sprinkler protection.

There is a public comment for E48 that would provide a more viable solution to the locking and restraint issue. This proposal should be disapproved in favor of E48.

Public Comment 3:

Michael G. Kraft, Ohio Division of State Fire Marshal requests Disapproval.

Commenter's Reason: In the monograph, staff analysis indicated the provisions would be better located in Chapter 10. The proponent addresses an elopement of occupants from I-2 occupancies. This proposal should be disapproved in favor of E51 which properly locates the provisions in Chapter 10. Moreover, this proposal fails to require the protected space be provided with an approved smoke detection system as required by proposal E51.

Final Action: AS AM AMPC _______ D

G85-06/07
410.3.4

Proposed Change as Submitted:

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

Revise as follows:

410.3.4 Proscenium wall. Where the stage height is greater than ~~50~~ 40 feet (15 240 mm), all portions of the stage shall be completely separated from the seating area by a proscenium wall with not less than a 2-hour fire-resistance rating extending continuously from the foundation to the roof.

Reason: The change lowers the proscenium-opening threshold where a fire barrier between the audience and the stage must be constructed. This will also become the threshold at which a fabric fire curtain or deluge water spray system is also installed in the proscenium opening.

Legitimate stages of heights greater than 45 feet have the ability to store flying scenery and other stage effects that can add significantly to stage fuel loads.

The last two code cycles have seen proposals which have attempted to be all-encompassing, addressing all types of stages to narrow the scope of height changes and various methods to determine the fuel load threshold at which a proscenium wall and proscenium opening protection must be provided. The committee found fault in an expanded scope that attempted to define all types of stages and did not accept that a fuel load basis could be used for new construction. This proposal lowers the current 50-foot limit to 40 feet where significant storage begins to occur.

A stage where significant combustibles can be stored is the point at which the threshold for a barrier should be established. Following the lead of the committee's current simple language while lowering the threshold will insure the design and construction requirements of the building code are clearly stated. Proscenium openings are typically in the 18-22 foot height range. At a height of 40 feet scenery and effects can still be stored above the stage creating a fire hazard that justifies protection.

The existing 50-foot stage height qualifier for proscenium walls should be lowered for several substantial reasons:

1. In the mid to late 90's, the model codes moved to redefine stages based solely upon stage height based upon a BCMC report. Stages to 40 feet in height can have similar fuel loads from hanging scenery and many stages are now being constructed to 49 feet to avoid the proscenium requirement while being able to store significant quantities of flying scenery above newly constructed stages.
2. Data provided by the NFPA Fire Analysis & Research Division as a part of the BCMC action was updated in July 2001 that provides some definitive insight into fires in theatres over a 19-year period. Annualized data of the report indicates there was one structural fire every four days in legitimate theaters with fixed seats. Approximately 8% of those fires were occurring in the performance or stage areas.

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

Committee Action: **Disapproved**

Committee Reason: The reduction of the stage height criteria where a proscenium wall is required was not justified sufficiently through loss statistics. There was a concern that statistics presented by proponent point out that we should be looking to reduce hazards in other areas of theaters.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gregory J. Cahanin, Cahanin Fire & Code Consulting, representing Thermotex Industries, requests Approval as Submitted.

Commenter's Reason: The change lowers the proscenium-opening threshold where a fire barrier between the audience and the stage must be constructed. This will also become the threshold at which a fabric fire curtain or deluge water spray system is also installed in the proscenium opening. Legitimate stages of heights greater than 40 feet have the ability to store flying scenery and other stage effects that can add significantly to stage fuel loads.

The last two code cycles have seen proposals which have attempted to be all-encompassing, addressing all types of stages to narrow the scope of height changes and various methods to determine the fuel load threshold at which a proscenium wall and proscenium opening protection must be provided. The committee found fault in an expanded scope that attempted to define all types of stages and did not accept that a fuel load basis could be used for new construction. This proposal lowers the current 50-foot limit to 40 feet where significant storage begins to occur.

A stage where significant combustibles can be stored is the point at which the threshold for a barrier should be established. Following the lead of the committee's current simple language while lowering the threshold will insure the design and construction requirements of the building code are clearly stated. Proscenium openings are typically in the 18-22 foot height range. At a height of 40 feet scenery and effects can still be stored above the stage creating a fire hazard that justifies protection.

The existing 50-foot stage height qualifier for proscenium walls should be lowered for several substantial reasons:

1. Engineering logic, the basis for most of the provisions of the building code, is the basis for this change, not fire loss statistics. This proposal seeks to isolate the size of the fuel load on the stage when it occurs. A greater fuel load on a stage exists at the point when storage above a stage can begin to occur. This change recognizes the fire potential and addresses it with increased fire protection provisions.
2. In the mid to late 90's, the model codes moved to redefine stages based solely upon stage height based upon a BCMC report. Earlier legacy code provisions set thresholds for fire curtains based upon square footage or type of curtains present. The simplification to a 50 foot height was not well justified or based upon sound engineering logic.
3. Stages to 40 feet in height can have similar fuel loads from hanging scenery and many stages are now being constructed to 49 feet to avoid the proscenium requirement while being able to store significant quantities of flying scenery above newly constructed stages.

Final Action: AS AM AMPC _______ D

G87-06/07

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

Proposed Change as Submitted:

Proponent: William Conner, ASTC, Bill Conner Associates LLC, representing the American Society of Theatre Consultants

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 fire curtain ~~of approved material~~ complying 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.~~

1. 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~~ <u>07</u> Fire Doors and <u>Other Opening Protectives</u> ~~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.

Committee Action: **Disapproved**

Committee Reason: The updated version of the referenced standard was not available for review.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bill Conner, representing himself, requests Approval as Submitted.

Commenter's Reason: The updated standard, NFPA 80-07 Fire Doors and Other Opening Protectives is now available.

Analysis: Review of the proposed new standards indicated that in the opinion of ICC Staff, the standard complies with ICC Standards criteria.

Final Action: AS AM AMPC _______ D

G88-06/07
410.3.5, 410.3.5.1, 410.3.5.2, 410.3.5.3, 410.3.5.4, Chapter 35

Proposed Change as Submitted:

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.

Committee Action: **Disapproved**

Committee Reason: Consistent with committee action on G87-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gregory J. Cahanin, Cahanin Fire & Code Consulting, representing himself requests Approval as Submitted by this public comment.

Commenter's Reason: At the time of the Orlando hearings NFPA 80 had not been publicly issued. It is now in print and available for use by all jurisdictions.

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 410.3.5 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.

Public Comment 2:

Michael L. Savage, Sr., Queen Anne's County/MDIA, Inc., representing himself, requests Approval as Submitted.

Commenter's Reason: I request the proposal be accepted as submitted as there is no national standard for fire safety curtains other than NFPA 80. NFPA 80 was the result of a five-year project undertaken by the Technical Committee Task Group and approved by the ANSI accredited standard process. This proposal would remove the gray area of fire curtains for enforcers, such as myself, and others in the field.

Analysis: Review of the proposed new standards indicated that in the opinion of ICC Staff, the standard complies with ICC Standards criteria.

Final Action: AS AM AMPC _______ D

G91-06/07
419

Proposed Change as Submitted:

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. <u>Walls separating dwelling units in the same building.</u>
2. <u>Walls separating sleeping units in occupancies in Group R-1 hotel, R-2 and I-1 occupancies.</u>
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. <u>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.</u>

> <u>**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.</u>

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

Committee Action: Disapproved

Committee Reason: The current language is necessary as Chapter 7 only addresses how to construct and not when to construct such separations. Deleting this section would undo a section that was just recently implemented into the code through code change G80-04/05.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lawrence Brown, CBO, National Association of Home Builders (NAHB), requests Approval as Submitted.

Commenter's Reason: The "Committee Reason" statement that, **"**The current language is necessary as Chapter 7 only addresses how to construct and not when to construct such separations," is incorrect.

<u>When</u> the "separation walls" outlined in current Section 419.2 are required to be rated is already clearly stated in current Section 708.1 #1 and #2. (See below)

<u>When</u> the "horizontal separation" of "floor/ceiling assemblies" for "R-1, R-2 and R-3" outlined in current Section 419.3 is required to be rated is already clearly stated in current Section 711.3. (See below)

If the assemblies are not required to be rated then no provision in Section 419 is applicable. There is no reason to duplicate the existing provisions from Section 708 and 711 in 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, these provisions already exist in the IBC (underlined). Though Section 419 speaks of R-3s, neither Sections 708 or 711 contains any provision directly related to Group R-3.

What is more of a concern is that current Section 419 is not complete as to all or the occupancies and construction that require "separation walls" and "horizontal separation". It is a disservice to the user of the IBC to lead them to believe adherence to Section 419 is all encompassing for these separations. As show in Section 708.1 and 711, there are many other fire-resistance-rated separations required based on the Construction Type and Occupancy. Anyone who uses the IBC on a regular basis for the plan review and inspection of the many different Construction Types and Occupancies already knows Section 419 provides no greater clarity than already provided for in Chapter 7. I can see how 419 may be of some help for someone who is inexperienced in using a Model Building Code, but the contents of 419 are better suited for a commentary on how the code works. There is no need to duplicate provisions of the IBC in a Section that is non-encompassing of all the related provisions.

SECTION 419.2 (Text)

419.2 Separation walls. <u>Walls separating dwelling units in the same building</u> and <u>walls separating sleeping units</u> in the same building shall comply with Section 708.

SECTION 708 - FIRE PARTITIONS (Text)
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 419.3 (Text)
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.

SECTION 711 - HORIZONTAL ASSEMBLIES (Text)
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.

Final Action: AS AM AMPC _______ D

G92-06/07, Part I
419 (New), 310.1, 508.3.1

Proposed Change as Submitted:

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

PART I – IBC GENERAL

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>

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.

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?

Committee Action: Approved As Submitted

Committee Reason: Though there were several minor concerns with the proposal the need for such provisions was seen as critical and it was pointed out that within the IBC all Group R occupancies will be sprinklered. This proposal will allow the building code to keep pace with development and revisions to zoning laws which allow such development**.**

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Ronald Nickson, National Multi Housing Council, requests Approval as Modified by this public comment for Part I.

Modify proposal as follows:

419.7 Accessibility. Accessibility shall be designed in accordance with Chapter 11. ~~The applicable requirements of Chapter 11 shall apply to each area within the live/work unit.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: To clarify the requirements for accessibility. The requirement that each area of the unit meet the accessibility requirements could trigger a requirement for an elevator to the second floor living area of units designed to have the first floor be used as the work area.

Public Comment 2:

William C. Green, West Valley City, Utah, requests Disapproval for Part I.

Commenter's Reason: While the elaborate proposal has a lot of merit, it may not be ready for prime time. How do we define the term "significant" in section 419.1? Does the word "tenant" refer to the business owner or the temporary employee who may sleep and work there as part of their agreement? Is it really necessary to protect every building that contains a "live-work unit" with a sprinkler system throughout regardless of the size of the building or the "live-work unit?" (See 419.5) In addition, the IRC provisions of R101.2 are very confusing. If I can build a manager's apartment for a rental storage complex per the IRC, why must it be sprinklered per the IBC? I would offer that occupancy separations between the business portions of these buildings and the residential portions of these buildings, along with the mixed occupancy ratio provisions in section 508 should resolve any life/safety concerns.

Public Comment 3:

Tim Pate, City and County of Broomfield, Colorado, representing himself, requests Disapproval for Part I.

Commenter's Reason: The exception to the initial section 419.1 would allow an office that is less than 10% of the area of the dwelling unit to be classified as only a dwelling unit and therefore not meet all of the handicap accessibility requirements for typical commercial space. One could have a 299 square foot (assuming a 3,000 s.f. live/work unit) commercial office (travel agency, lawyer office, insurance office etc.) on the main floor and we would not be able to regulate the accessible entrance nor accessible route throughout this area. This new section will also limit the total storage area throughout entire unit to only be 10% of the work area. You would have to count all closets upstairs which are within the dwelling unit areas.

Final Action: AS AM AMPC _______ D

G92-06/07, Part II
R101.2

Proposed Change as Submitted:

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

PART II – IRC BUILDING/ENERGY

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.

> **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*.

Reason: 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?

Committee Action: **Approved as Submitted**

Committee Reason: The proposed language helps make it clear that live/work units are required to have fire suppression throughout. This additional language provides needed clarity as to the intent and aids the code official.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William C. Green, West Valley City, Utah, requests Disapproval for Part II.

Commenter's Reason: While the elaborate proposal has a lot of merit, it may not be ready for prime time. How do we define the term "significant" in section 419.1? Does the word "tenant" refer to the business owner or the temporary employee who may sleep and work there as part of their agreement? Is it really necessary to protect every building that contains a "live-work unit" with a sprinkler system throughout regardless of the size of the building or the "live-work unit?" (See 419.5) In addition, the IRC provisions of R101.2 are very confusing. If I can build a manager's apartment for a rental storage complex per the IRC, why must it be sprinklered per the IBC? I would offer that occupancy separations between the business portions of these buildings and the residential portions of these buildings, along with the mixed occupancy ratio provisions in section 508 should resolve any life/safety concerns.

Final Action: AS AM AMPC _______ D

G99-06/07
Table 503

Proposed Change as Submitted:

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) / 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
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 remain unchanged)

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 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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
[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] Ackman, D. (2001 March, 2). "Movie Theaters of the Absurd." *Forbes.com.* Retrieved from: http://www.forbes.com/2001/03/02/0302movies.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.
[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.

Committee Action: **Disapproved**

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G99-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G99-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	Hgt(feet)	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 ~~UL~~ 19,950	3 ~~15,500~~ 13,125	2 ~~8,500~~ 8,400	3 ~~14,000~~ 11,550	2 ~~8,500~~ 8,400	3 ~~15,000~~ 12,600	~~2~~ 1 ~~11,500~~ 8,925	1 ~~5,500~~ 4,200

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G100-06/07

Table 503

Proposed Change as Submitted:

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) / 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
A-2	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 remain unchanged)

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.

Committee Action: **Disapproved**

Committee Reason: Based upon proponents request. See committee reason for G10-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G100-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G100-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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
A-2	S A	UL ~~UL~~ 7,200	~~11~~ 3 ~~UL~~ 5,700	~~3~~ 2 ~~15,500~~ 3,750	~~2~~ 1 ~~9,500~~ 2,400	~~3~~ 2 ~~14,000~~ 3,300	~~2~~ 1 ~~9,500~~ 2,400	~~3~~ 2 ~~15,000~~ 3,600	~~2~~ 1 ~~11,500~~ 2,550	1 ~~6,000~~ 1,200

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G101-06/07
Table 503

Proposed Change as Submitted:

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 remain unchanged)

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.

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] *Religious and Funeral Properties: Facts and Figures.* (February 2006). National Fire Protection Association. Retrieved from: http://www.nfpa.org/itemDetail.asp?categoryID=1160&itemID=27345&URL=Research%20&%20Reports/Fact%20sheets/Safety%20in%20other%20occupancies/Religious%20and%20funeral%20properties

[11] Baptist Press Staff. (2005). Churches Shelter Hurricane Refugees, Relief Units Prepare to Deploy. *Lifeway.* Retrieved from: http://www.lifeway.com/lwc/article_main_page/0,1703,A%253D160765%2526M%253D50011,00.html

[12] *An Early View from Natchez, MS*. (2005, September 11). National Writing Project. Retrieved from: http://blogs.writingproject.org/blogwrite310/2005/09/11

[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

[14] 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

[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.

Committee Action: **Disapproved**

Committee Reason: Based upon proponents request. See committee reason for G10-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G101-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G101-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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		TYPE OF CONSTRUCTION								
	Hgt(feet)	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~~ 5 ~~UL~~ 19,950	3 ~~15,500~~ 13,125	2 ~~9,500~~ 8,400	3 ~~14,000~~ 11,550	2 ~~9,500~~ 8,400	3 ~~15,000~~ 12,600	~~2~~ 1 ~~11,500~~ 8,925	1 ~~6,000~~ 4,200

(Portions of table not shown do not change)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G102-06/07
Table 503

Proposed Change as Submitted:

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

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		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
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		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 remain unchanged)

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 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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.

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] *Selected Types of Disability for the Civilian Non-institutionalized Population 5 Years and Over by Age, 2000*. (2004, April 14). US Census, 2000. Retrieved from: http://www.census.gov/population/cen2000/phc-t32/tab01-US.pdf

[11] *Disability Data from the American Community Survey: A Brief Examination of the Effects a Question Redesign in 2003*. (2005, January, 8). US Census. Retrieved from: http://www.census.gov/hhes/www//disability/ACS_disability.pdf

[12] *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

[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] 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.

Committee Action: Disapproved

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G102-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G102-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

Dave Collins, FAIA and Kate Dargan, Co-chairs Code Technology Committee Height and Area Study Group request Approval as Modified by this public comment.

Replace proposal with the following:

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 UL	5 37,500	~~4~~ 3 23,000	5 28,500	~~4~~ 3 19,000	5 36,000	3 18,000	2 9,000

(Portions of table not shown do not change)

Commenter's Reason: This public comment reinstates the current values in Table 503 for Group B except for the proposed change to the height requirements for Types IIB and IIIB.

One area of concern identified for study by the Height and Area Task Group was 4 and 5 story buildings of Type IIB and IIIB construction. The table below shows the occupancies in the IBC where that condition exists for sprinklered buildings. In addition, the table shows the sprinklered height allowances for these occupancies in the legacy codes.

Type IIB, Type IIIB (Unprotected Construction) Story Comparison (w/ NFPA 13 Sprinklers)

	SBC	NBC	UBC	2006 IBC
B	5	4	2	**5**
F-2	4	4	2	**4**
M	5	3	2	**5**
S-1	4	3	2	**4**
S-2	4	4	2	**5**
R* (13)	5	4	4	**5**
R*(13R)	4	4	3	**4**

* - Applies for R-1, R-2 and R-3 Use Groups

The study group noted that for Use Group B, M, S-1, and R buildings of Type IIB or Type IIIB construction, the allowance for 4 or 5 stories in the IBC was premised on the story heights allowed in the SBC. In all these instances, the SBC sprinklered height allowance for these Use Groups relied on a multiple story sprinkler increase. For example, for Use Group B, the SBC allowed 2 stories for unsprinklered construction and 5 stories for sprinklered construction. This exceeds the one story sprinkler height increase incorporated in the IBC height and area provisions.

Based on this review, the study group identified two anomalies from what was permitted by the legacy codes. First, the story height allowance for S-2 use groups is not based on any of the legacy code allowances. Second, for Use Group B, M, S-1, and R (Type IIB and IIIB construction), the IBC story height allowance for unsprinklered construction exceeds what was allowed by any of the legacy codes. For example, the maximum height for an unsprinklered Type IIB office building in any of the legacy codes was the NBC allowance for 3 stories. Currently, the IBC allows 4 stories for this condition. Rather than modify the sprinkler increase in the IBC, the study group suggested the following recommended story height changes:

IBC Table 503 Values

Use Group	IIB		IIIB	
	Unsp.	Spr.	Unsp.	Spr.
B	3	4	3	4
M	2	3	2	3
S-1	2	3	2	3
S-2	3	4	3	4
R* (13)	3	4	3	4

* - Applies for R-1, R-2 and R-3 Use Groups

In essence, these reductions would eliminate the anomalies created by the multi-story SBC sprinkler increase and drop the IBC value back to the next least restrictive legacy code (in these cases, the NBC).

The study group noted that the motivation for these recommendations was to address anomalies associated with unsprinklered 4 and 5 story buildings of Type IIB and IIIB construction. No evidence was submitted to suggest that the existing sprinklered height allowances for these buildings in either the IBC or the legacy codes had created an unsafe condition that requires correction.

Subsequent discussion by the study group noted that a more comprehensive solution was needed to address R-1, R-2, and R-3 use groups. As a result, R occupancies were dropped from this recommendation with the understanding that work would continue. Unfortunately, the ICC Public Comment process did not present an acceptable option for addressing the study group's recommendations for Use Group M, S-1, and S-2. As a result, these modifications will have to be considered in future code change cycles. The only study group recommendation that could be incorporated in the 2006/2007 Public Comment period was the proposed reduction in story height for Use Group B, which is being presented as the public comment for G102. It is noted that the B use group represents one of the safer occupancies based on fire records.

In Orlando, Florida during the ICC Code Development Hearings, the creation of the CTC Height and Area Study Group was initiated in order to work toward an acceptable compromise among the proponents of the 20-plus code change proposals submitted on the height and areas provisions.

Toward that end, we have worked tirelessly to find common ground, address the concerns of building safety, and property protection, and to develop specific public comments to code proposals. That work is not yet complete, however a great deal of clarity and understanding of the subjects surrounding the changes has been gained. As a result, the Study Group has requested and been tasked to continue to work in the short-term and more fully explore the subject.

Our work is defined as short-term code proposals for the 2007/2008 cycle and the long-term proposals that may be prepared following publication of the 2009 IBC. The Study Group is proposing this public comment to G102-06/07 for this cycle. The Study Group has reviewed the development of Table 503 in the IBC and has come to agreement that some changes to height & area provisions are recommended but they are not the core issue for improving building safety when considering adequate fire protection features, maintenance and inspection of such features, and emergency response. The table is in need of changes in order for the values to be consistent with the development philosophy. However, these changes were beyond the scope of the various code changes that had been proposed in the current cycle and will require future code changes to accommodate them.

Height and area is often viewed as the "starting point" relative to building safety. While this is indeed true, it is not the only factor to be considered when evaluating building safety. We have concluded that much of the discussion relative to building safety falls into the CTC area of study for "Balanced Fire Protection". The Study Group will continue to work on these concerns and has been charged to address them through continued improvement involving changes to not only the heights and area limits themselves but also related and integral building systems such as:

1. Exiting
2. Compartmentalization
3. Smoke Management
4. Automatic Sprinklers
5. Fire-Resistive Construction
6. Structural Integrity During Fires
7. Better Inspection and Maintenance Compliance,
8. Use of Fire Data, its Acquisition and Analysis

The formation of the Study Group has led to a solid base for longer-term discussions and more proposals to be developed in the future. There is an interest and an agreement among the participants to continue the effort to address these many unresolved and unanswered issues.

We look forward to working with the ICC membership in the development and consideration of future changes to the code that can truly improve the code to meet identified goals and objectives. Thank you for your patience as we move forward to achieve this worthwhile endeavor.

For those interested in the activities of this study group, you are encouraged to visit the CTC website at: http://www.iccsafe.org/cs/cc/ctc/Balanced.html

Height and Area Study Group Memberships - Laura Blaul, Cal Chiefs, CA; Carl Baldassarra, Schirmer Engineering; David Collins, AIA (co-chair); Kate Dargan, CA OSFM (co-chair); Sean DeCrane, IAFF (non-voting); Dave Frable, GSA; Sam Francis, AF&PA; Kevin Kelly, NFSA; Jim Messersmith, PCA; Jim Narva, NASFM; Ron Nickson, NMHC; Larry Perry, BOMA; Dennis Richardson, Peninsula, East Bay, and Monterey Bay Chapters of ICC ; Emory Rogers, VBCOA; Jerry Sanzone, BOAF; Jonathan Siu, City of Seattle, OR; Rick Thornberry, AFSCC; Robert Wills, AISI.

Public Comment 3:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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

		TYPE OF CONSTRUCTION								
Group	Hgt(feet)	**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~~ 7 ~~UL~~ 34,200	5 ~~37,500~~ 22,500	~~4~~ 3 ~~23,000~~ 14,400	~~5~~ 4 ~~28,500~~ 19,800	~~4~~ 3 ~~19,000~~ 14,400	5 ~~36,000~~ 21,800	3 ~~18,000~~ 15,300	2 ~~9,000~~ 7,200

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G103-06/07
Table 503

Proposed Change as Submitted:

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 remain unchanged)

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 3 A 23,500	2 14,500
BOCA 1999	S 3 A 19,800	2 14,400
SBC 1997	S 2 A 18,000	1 12,000
UBC 1997	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 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:

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 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.

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 United States Fire Administration. (2004, December). *School Fires*. Topical Fire Research Series, 4. Retrieved from: http://www.usfa.fema.gov/downloads/pdf/tfrs/v4i6.pdf

11 U.S. Department of Education. (2004). Digest of Education Statistics 2004. Table 2.

12 *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

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.

Committee Action: Disapproved

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G103-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G103-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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 A	TYPE I B	TYPE II A	TYPE II B	TYPE III A	TYPE III B	TYPE IV HT	TYPE V A	TYPE V B
		UL	**160**	**65**	**55**	**65**	**55**	**65**	**50**	**40**
E	**S** **A**	UL UL	5 ~~UL~~ 34,200	3 ~~26,500~~ 22,500	2 ~~14,500~~ 14,400	3 ~~23,500~~ 19,800	2 ~~14,500~~ 14,400	3 ~~25,500~~ 21,600	1 ~~18,500~~ 15,300	1 ~~9,500~~ 7,200

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC ________ D

G104-06/07
Table 503

Proposed Change as Submitted:

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) / Hst(S)	TYPE OF CONSTRUCTION: TYPE I A	TYPE I B	TYPE II A	TYPE II B	TYPE III A	TYPE III B	TYPE IV HT	TYPE V A	TYPE V B
		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 remain unchanged)

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:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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. *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.

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] *Nursing Home Statistics*. (2000). American Nursing Association. Retrieved from: http://www.efmoody.com/longterm/nursingstatistics.html.
[11] *Nursing Facility Control (CMS OSCAR Form 671:F10, F13)*. (June 2005). American Nursing Association. Retrieved from: www.ahca.org.
[12] *Long Term Care, Fact Sheet (FS27R).* American Association of Retired Persons. Retrieved from: www.aarp.org.
[13] Bernell, S and Gregory, S. (2000, December). *Paying for Hospice Care, Fact Sheet*. American Association of Retired Persons. Retrieved from: http://www.aarp.org.
[14] Ahrens, M. (2003, June). *Facilities that Care for the Aged Including Nursing Homes and Residential Board and Care.* National Fire Protection Association. Retrieved from: www.nfpa.org.
[15] *Day Care/Adult Care/Assisted Living.* (2005, September 21). International Code Council: Code Technology Committee. Retrieved from: http://www.iccsafe.org/cs/cc/ctc/DayCare_PrelimAnalysis.pdf
[16] Lipton, E. (2006, February 1). Committee Focuses on Failure to Aid New Orleans's Infirm. *New York Times*, Retrieved from: http://www.nytimes.com/2006/02/01/national/nationalspecial/01katrina.html?ex=1296450000&en=33ea15902481b29e&ei=5088&partner=rssnyt&emc=rss
[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.

Committee Action: **Disapproved**

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G104-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G104-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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-1	**S** **A**	**UL** **UL**	9 ~~55,000~~ 19,950	4 ~~19,000~~ 13,125	3 ~~10,000~~ 8,400	4 ~~16,500~~ 11,550	3 ~~10,000~~ 8,400	4 ~~18,000~~ 12,600	3 ~~10,500~~ 8,925	2 ~~4,500~~ 4,200

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G105-06/07
Table 503

Proposed Change as Submitted:

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) / 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~~ 3 ~~UL~~ 15,100	~~2~~ 1 ~~15,000~~ 6,800	~~1~~ NP ~~11,000~~ NP	1 ~~12,000~~ 6,800	NP NP	1 ~~12,000~~ 6,800	1 ~~9,500~~ 5,200	NP NP

(Portions of table not shown remain unchanged)

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:

1. *"Rapid deflection occurred and imminent collapse became apparent between 1,000 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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 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.

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 *Nursing Home Statistics*, (2000) American Health Care Association. Retrieved from: http://www.efmoody.com/longterm/nursingstatistics.html
11 *Nursing Facility Control: CMS OSCAR Form 671:F10, F13* (June 2005). American Health Care Association. Retrieved from: www.ahca.org

[12] *Long Term Care - Fact Sheet (FS27R).* American Association of Retired Persons. Retrieved from: www.aarp.org
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[14] Ahrens, M. (2003, June). *Facilities that Care for the Aged Including Nursing Homes and Residential Board and Care.* National Fire Protection Association. Retrieved from: www.nfpa.org.
[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.

Committee Action: Disapproved

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G105-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G105-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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

		TYPE OF CONSTRUCTION								
Group	Hgt(feet)	**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-2	**S** **A**	UL UL	4 ~~UL~~ 17,100	2 ~~15,000~~ 11,250	1 ~~11,000~~ 7,200	1 ~~12,000~~ 9,900	NP NP	1 ~~12,000~~ 10,800	1 ~~9,500~~ 7,650	NP NP

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G106-06/07
Table 503

Proposed Change as Submitted:

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 remain unchanged)

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:

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 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/

[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] *Trends in Adult Day Centers*. National Adult Day Services Association. Retrieved from: http://www.nadsa.org/press_room/facts_stats.htm.

[11] *Critical Facts About Young Children and Early Childhood Programs in the United States*. (2002). National Association for the Education of Young Children. Retrieved from: http://www.naeyc.org/ece/critical/facts2.asp

[12] ibid.

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

[14] *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

[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.

Committee Action: **Disapproved**

Committee Reason: Based upon proponents request. See committee reason for G10-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G106-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G106-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Final Action: AS AM AMPC _______ D

G107-06/07
Table 503

Proposed Change as Submitted:

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** **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 remain unchanged)

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 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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

[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] 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.

Committee Action: Disapproved

Committee Reason: Based upon proponents request. See committee reason for G10-06/07.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John C. Dean, the National Association of State Fire Marshals requests Approval as Submitted.

Commenter's Reason: Proposal G107-06/07 was disapproved by the IBC-General Committee because it was one of a number of proposals that the proponents encouraged to be disapproved based upon an overall effort by an ICC Code Technology Committee study group to address concerns with height and area within all areas of the IBC. Due to the lack of any specific action from the study group on this proposal, we request that proposal G107-06/07 be approved as submitted based on the reasons originally stated in the proposal's justification.

Public Comment 2:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment.

Replace proposal with the following:

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**
R-1	**S** **A**	UL UL	~~11~~ 9 UL 22,800	4 ~~24,000~~ 15,000	~~4~~ 3 ~~16,000~~ 9,600	4 ~~24,000~~ 13,200	~~4~~ 3 ~~16,000~~ 9,600	4 ~~20,500~~ 14,400	3 ~~12,000~~ 10,200	2 ~~7,000~~ 4,800

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G108-06/07
Table 503

Proposed Change as Submitted:

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	**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 remain unchanged)

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 ^{o}F and 1,200^{o}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^{o}F at six minutes and 1,220^{o}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^{o}F and 1,380^{o}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.
- *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-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
[8] *Firefighters*. (2005, February 1). United States Fire Administration. Retrieved from: http://www.usfa.fema.gov/statistics/firefighters/
[9] *Law Enforcement Statistics*. (2005, October 17). Bureau of Justice Statistics. Retrieved from: http://www.ojp.usdoj.gov/bjs/lawenf.htm.
[10] *Emergency Medical Technicians and Paramedics*. (2004). Bureau of Labor Statistics. Retrieved from: http://www.bls.gov/oco/ocos101.htm.
[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.

Committee Action: Disapproved

Committee Reason: Based upon proponents request. See committee reason for G10-06/07**.**

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

William M. Connolly, State of New Jersey, Department of Community Affairs, Division of Codes and Standards requests Approval as Modified by this public comment

Replace proposal with the following:

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	S A	UL UL	~~11~~ <u>9</u> ~~UL~~ <u>22,800</u>	4 ~~24,000~~ <u>15,000</u>	4 <u>3</u> ~~16,000~~ <u>9,600</u>	4 ~~24,000~~ <u>13,200</u>	~~4~~ <u>3</u> ~~16,000~~ <u>8,800</u>	4 ~~20,500~~ <u>14,400</u>	3 ~~12,000~~ <u>10,200</u>	2 ~~7,000~~ <u>4,800</u>

(Portions of table not shown remain unchanged)

Commenter's Reason: The original proposal inserted values from the 1997 UBC into IBC Table 503. While we agree that some changes to the table are warranted it is felt that the UBC values are too restrictive and may not accurately represent a large portion of the built inventory. For this reason this modification inserts values from the 1999 BOCA code. In some cases the BOCA codes are greater than the original proposal and in some cases they are smaller. It is felt that the BOCA values are a reasonable compromise and have served well in previous years.

Final Action: AS AM AMPC _______ D

G110-06/07
503.1

Proposed Change as Submitted:

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

Revise as follows:

503.1 General. The height and area ~~for~~ <u>of a</u> building~~s of different construction types shall be governed by the intended use of the building and~~ shall not exceed the limits <u>specified</u> in Table 503 <u>based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302</u> except as modified hereafter. Each ~~part~~ <u>portion</u> of a building ~~included within the exterior walls or the exterior walls and fire walls where provided~~ <u>separated by one or more fire walls complying with Section 705</u> shall be ~~permitted~~ <u>considered</u> to be a separate building.

Reason: The purpose of the proposal is to establish technically sound charging language for the provisions of Section 503. The current language references buildings of different construction types but not buildings of a single construction type. Section 602.1 requires buildings to be classified into a single construction type. Section 503, however, is silent on buildings complying with Section 602.1. Section 705.1 permits portions of a building separated by fire walls to be considered as separate buildings. This, in turn, provides the option of classifying portions of buildings separated by fire walls into different types of construction. Section 503, however, is also silent on buildings complying with Section 705.1. Section 503 limits the height and area of a building with different types of construction by reference to Table 503. Table 503, however, is silent on its application to buildings with different types of construction.