G73–07/08
404.1.1

Proponent: Sarah A. Rice, CBO, Schirmer Engineering Corporation

Revise definition as follows:

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

ATRIUM. ~~An opening~~ A through penetration of a horizontal assembly connecting two or more stories other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment.~~,~~ Such penetrations are not open to the exterior ~~which is closed~~ at the top ~~and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with Section 505~~.

Reason: Using the provisions in Section 404 is only 1 of the 14 methods that the IBC in Section 707.2 provides a designer when they need to address through penetrations of horizontal assemblies (i.e, floor openings/penetrations) in lieu of putting a shaft.

Since the initial writers of the covered mall section developed what is now found in Section 402 of the IBC, the science of handling floor openings has become quite sophisticated. In fact, if floor openings in covered mall buildings were not considered as atrium, there would not be many other viable options to a designer that would allow the openness associated with a covered mall building. While the code previously said that a smoke control system should be installed in a covered mall building when it sort of looks and acts like an atrium, the exclusion of a mall in the definition of "atrium" actually created a language vs. application conflict in the IBC. With the words "and not defined as a mall" in the definition of atrium it would literally not be allowed to be applied to a covered mall building. This is inconsistent with where the IBC has been going with regard to floor penetrations.

With the advent of a technologically based design method for smoke control for both small and large spaces there is no longer a reason to not allow the floor opening in a covered mall building to be considered fully as an atrium if the design wishes to utilize that option in Section 707.2. There is no technological reason why the opening in floor assemblies between stories in a covered mall building should not be addressed the same as in any other type of building – which would be to use Section 707.2 and potentially any of the 14 exceptions it contains.

The last sentence is unnecessary language – the code has very specific language about what is and isn't a mezzanine Nothing is lost by he last sentence.

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

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

G74–07/08
404.5

Proponent: Raymond A. Grill, PE, Arup, representing himself

Revise as follows:

404.5 (Supp) Enclosure of atriums. Atrium spaces shall be separated from adjacent spaces by a 1-hour fire barrier constructed in accordance with Section 706 or a horizontal assembly constructed in accordance with Section 711, or both.

Exceptions:

1. A glass wall forming a smoke partition where automatic sprinklers are spaced 6 feet (1829 mm) or less along both sides of the separation wall, or on the room side only if there is not a walkway on the atrium side, and between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction. The glass shall be installed in a gasketed frame so that the framing system deflects without breaking (loading) the glass before the sprinkler system operates.
2. A glass-block wall assembly in accordance with Section 2101.2.5 and having a 3/4-hour fire protection rating.
3. The adjacent spaces of any three floors of the atrium shall not be required to be separated from the atrium where such spaces are ~~included~~ considered in the design of the smoke control system.

Reason: The current language implies that the volume of floors open to the atrium need to be included in the atrium exhaust system regardless of the geometry or other factors. This language has been interpreted to require things like even distribution of makeup air and exhaust throughout floors open to an atrium. This could lead to not having appropriate exhaust volume in the atrium space itself. Methods for determining appropriate

exhaust rates for atriums are driven by maintaining the calculated smoke layer 6 feet above the egress path. If the fire is considered to be on a floor open to the atrium, this criteria could never be met. In some jurisdictions, it has been utilized to eliminate atrium designs for buildings. This was not the intent of the provision.

Spaces open to the atrium should be considered from a fire safety perspective in the design of the overall space and should be addressed in the rational analysis which is required to be prepared as a basis for design for smoke control systems.

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

Analysis: An errata occurred in the 2007 Supplement. The reference in Section 404.5, Exception 2 is Section 2101.2.5 instead of 2110.

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

G75–07/08
404.8

Proponent: Raymond A. Grill, PE, Arup, representing himself

Revise as follows:

404.8 Travel distance. In other than the lowest level of the atrium, where the required means of egress is through the atrium space, the portion of exit access travel distance within the atrium space shall not exceed 200 feet (60 960 mm). The travel distance requirements for areas of buildings open to the atrium and where access to the exits is not through the atrium, shall comply with the requirements of Chapter 10.

Reason: The change clarifies the intent of the code. This is consistent with the language in the *Uniform Building Code* Handbook which is a legacy code to the IBC. The discussion is located on Page 51 of the 1997 UBC Handbook.

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

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

G76–07/08
406.2.3, 406.2.4, 406.3.3, 1607.7, 1607.7.3, Table 1607.1

Proponent: Edwin Huston, National Council of Structural Engineers Association (NCSEA), representing the NCSEA Code Advisory Committee – General Engineering Subcommittee

Revise as follows:

406.2.3 Guards. Guards shall be provided in accordance with Section 1013 ~~at exterior and interior vertical openings on floor and roof areas where vehicles are parked or moved and where the vertical distance to the ground or surface directly below exceeds 30 inches (762 mm)~~. Guards serving as vehicle barrier systems shall comply with Sections 406.2.4 and 1013.

406.2.4 Vehicle barriers systems. ~~Parking areas shall be provided with exterior or interior walls or vehicle barriers, except at pedestrian or vehicular accesses, designed in accordance with Section 1607.7.~~ Vehicle barriers systems not less than 2 feet (607 mm) high shall be placed at the end of drive lanes, and at the end of parking spaces where the ~~difference in adjacent floor elevation~~ vertical distance to the ground or surface directly below is greater than 1 foot (305 mm). Vehicle barrier systems shall comply with the loading requirements of Section 1607.7.3.

406.3.3 Construction. Open parking garages shall be of Type I, II or IV construction. Open parking garages shall meet the design requirements of Chapter 16. For vehicle barrier~~s~~ systems~~,~~ see Section 406.2.4.

1607.7 Loads on handrails, guards, grab bars and vehicle barrier~~s~~ systems. Handrails, guards, grab bars as designed in ICC A117.1 and vehicle barriers systems shall be designed and constructed to the structural loading conditions set forth in this section.

1607.7.3 Vehicle barrier~~s~~ systems. Vehicle barrier systems for passenger cars shall be designed to resist a single load of 6,000 pounds (26.70 kN) applied horizontally in any direction to the barrier system and shall have anchorage or attachment capable of transmitting this load to the structure. For design of the system, the load shall be assumed to act at a minimum height of 1 foot, 6 inches (457 mm) above the floor or ramp surface on an area not to exceed 1 square foot (305 mm^2), and is not required to be assumed to act concurrently with any handrail or guard loadings specified in the preceding paragraphs of Section 1607.7.1. Garages accommodating trucks and buses shall be designed in accordance with an approved method that contains provision for traffic railings.

TABLE 1607.1 (Supp)
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS AND MINIMUM CONCENTRATED LIVE LOADS

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
39. Vehicle barriers system	See Section 1607.7.3	

(Portions of table and footnotes not shown remain unchanged)

Reason: Section 406.2.3 - The suggested change deletes ambiguous text and defers to Section 1013 for where guards are required. The added sentence makes it clear that guards serving as vehicle barrier systems must comply with requirements for both systems.

Section 406.2.4 - The existing first sentence is not needed since Section 406.2.3 clearly indicates that any edge of a floor that is open to the floor or surface below must be provided with a guard, which may be a wall (see Section 1013). The second sentence is being retained and revised to recognize that the surface below the parking surface may not be another floor, but may be the ground. The new sentence being added at the end retains provisions in the existing first sentence.

Other changes are editorial for consistency in terminology.

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

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

G77–07/08
406.2.4, 1607.7.3

Proponent: Donald R. Monahan, Walker Parking Consultants, representing the Parking Consultants Council of the National Parking Association

THESE PROPOSALS ARE ON THE AGENDA OF THE IBC GENERAL AND IBC STRUCTURAL CODE DEVELOPMENT COMMITTEES AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IBC GENERAL

Revise as follows:

406.2.4 Vehicle barriers. Parking areas shall be provided with exterior or interior walls or vehicle barriers, except at pedestrian or vehicular accesses, designed in accordance with Section 1607.7. Vehicle barriers not less than 2 feet 9 inches (~~607~~ 835 mm) high shall be placed at the end of drive lanes, and at the end of parking spaces where the difference in adjacent floor elevation is greater than 1 foot (305 mm).

Exception: Vehicle storage compartments in a mechanical access parking garage.

PART II – IBC STRUCTURAL

Revise as follows:

1607.7.3 Vehicle barriers. Vehicle barrier systems for passenger cars shall be designed to resist a single load of 6,000 pounds (26.70 kN) applied horizontally in any direction to the barrier system and shall have anchorage or attachment capable of transmitting this load to the structure. For design of the system, two loading conditions shall be analyzed. The first condition shall apply the load ~~shall be assumed to act~~ at a ~~minimum~~ height of 1 foot, 6 inches (457 mm) above the floor or ramp surface. The second loading condition shall apply the load at 2 feet, 3 inches (686 mm) above the floor or ramp surface. The more severe load condition shall govern the design of the barrier restraint system. The load shall be assumed to act on an area not to exceed 1 square foot (305 mm^2), and is not required to be assumed to act concurrently with any handrail or guard loadings specified in the preceding paragraphs of Section 1607.7.1. Garages accommodating trucks and buses shall be designed in accordance with an approved method that contains provision for traffic railings

Reason: The current code provisions for vehicle barriers are outdated and need to be revised to account for the increased presence of trucks, vans and sport utility vehicles inside parking structures.

The latest vehicle sales data available clearly shows the following: Approximately 50% of the vehicles sold in 2006 are light trucks, vans or SUV's (LTVSUV's); these vehicles have bumper heights (front bumper) well in excess of the 18 inches above the pavement that the current code requires for the load application. Bumper height data is available from organizations such as Consumer Reports. We used such data as a guide and measured a representative sample of 50 out of the 135+ vehicle types for LTVSUV's. We also analyzed 2006 sales data for the 175+ vehicle types for passenger automobiles and calculated the bumper load height that would represent the 85th percentile based on sales. We determined that a 27-inch bumper height should be used. Vehicles such as the Nissan Armada, Hummer H3, Ford F150 and Jeep Commander are representative of vehicles with the 27 inch bumper height.

The attached sales table (Table 1) clearly shows the following:

The current code requirement of 18 inches covers only 52% of the vehicles on the road. The proposed 27 inch requirement would cover 96% of vehicles on the road. The bumper height appears to converge on the 27 inch proposed and the 4% of vehicles not covered have bumper heights only 2 inches taller. We measured only one rare model with a height much higher than 27": a Hummer H3 with a lift kit which measured 34 inches. We believe the 27 inch proposed requirement is reasonable and is substantiated by sales and measured bumper data.

Note that the barrier restraint may be horizontal or vertical, may be anchored at the bottom or at the ends. Therefore, one cannot determine in advance whether load condition #1 or load condition #2 will represent the most severe condition governing the design. Therefore, both load conditions should be specified.

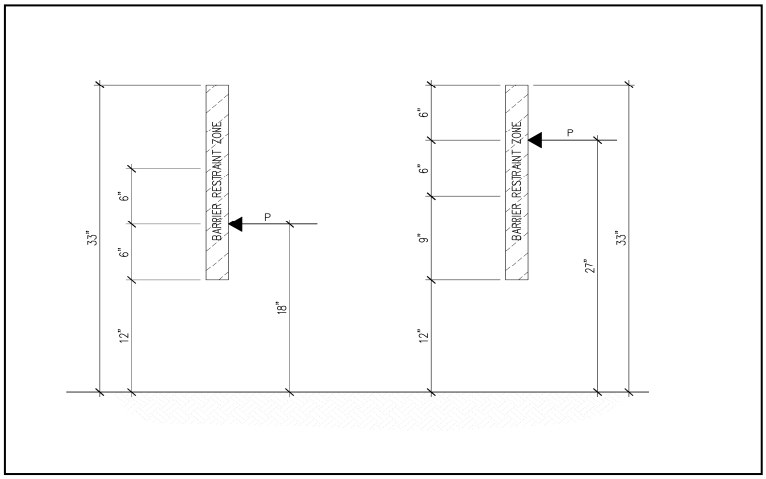


Figure 1. Bumper Load Application

In the 1960's and 1970's, a number of accidents occurred in parking garages and open parking structures where passenger vehicles went through the exterior walls and often over the edge of the parking facility with severe injury and often death to the vehicle occupants. These events coincided with the building boom of self-park parking facilities where the driver parked his/her own vehicle.

At that time, some of the state and city building codes had design requirements for the barrier restraints, sometimes called bumper walls or guard rails. However, the commonly used model building codes such as the Uniform Building Code (UBC) by the International Conference of Building Officials mainly used in the West, the BOCA Code by the Building Officials & Code Administrators International used in the Midwest and East, and the Standard Building Code (SBC) by the Southern Building Code Congress International used mainly in the Southeast had no specific provisions for the design of barrier restraints in multistory parking facilities. Several state codes including the New York, Wisconsin, Kentucky and Ohio codes did have barrier restraint barrier requirements. Ohio requirements were 500 pounds per lineal foot at 18 inches above the floor at the ends of parking spaces and 1000 pounds per lineal foot at 18 inches above the floor at the ends of drive aisles.

To fill this lack of consensus on the proper method to design parking facility barrier restraints, the Parking Consultants Council (PCC) of the National Parking Association (NPA) formed in the mid 1970's a Building Code Committee to develop *Recommended Building Code Provisions for Open Parking Structures.* This document was published in July 1980.

Regarding barrier restraints, the committee made a survey of NPA members, who are mainly parking facility operators, asking for information and experience with barrier restraint failures. This information showed that where rational design methods had been used with as low as a 2000 pound horizontal load applied against a barrier in a parking space, no failures had occurred. However, failures had occurred where unreinforced masonry walls, pipe railings, precast concrete wheel stops, and similar restraints had been used.

The PCC Building Code Committee also obtained proprietary test data of mid-1970's vintage from the Automotive Research Laboratories at the University of Michigan, Ann Arbor, Michigan. This testing was for the energy absorption of passenger vehicle bumper systems. The goal of the testing was to set a standard for the manufacture of passenger vehicle bumper systems such that for a vehicle striking a wall in a perpendicular manner at a maximum speed of 5 miles-per-hour, it would sustain little or no damage. Also, the maximum weight of a passenger vehicle at that time was approximately 5000 pounds. Based on this information and with the assistance of the Structural Engineering Department at the University of Michigan, a static ultimate horizontal design point load of 10,000 pounds located 18 inches above the floor was developed as the criteria for the design of parking structure barrier restraint systems.

It should be noted that the act of a bumper wall resisting a vehicle striking it is truly a dynamic energy problem—not a static load problem. However, building codes at that time used percentages of static loads to allow for the impact effects on structures. Thus, the use of the 10,000 pound ultimate horizontal static load was deemed appropriate for a 5,000-pound vehicle traveling at a speed of 5 mph.

Therefore, in 1980, the PCC Code Committee developed the following for the design of barrier restraints, "*Barrier railings should be placed at the ends of drive lanes and at the ends of parking spaces at the perimeter of the structure and at the end of parking spaces where the difference in floor elevation is greater than one foot. Barrier railings should be not less than two feet in height and should be designed for a minimum horizontal ultimate load of 10,000 pounds applied at a height of one foot six inches above the floor at any point along the structure."* A footnote stated, "*It is the intent that the horizontal load be considered as applied over a one-foot square area with the load distributed through the barrier railing system into the main structural elements in a manner which is logical and appropriate for the barrier railing system under consideration."*

The PCC barrier rail recommendation was first adopted by the ICBO in the 1990 UBC Supplement. Many multistory parking structures designed prior to 1990 did not meet this requirement. Similar language was incorporated into a number of the model building codes with, in some cases, the load being changed from a 10,000 pound ultimate load to a 6,000 pound service load. The 6000 pound service load with the proper load factor is approximately the same as the 10,000 pound ultimate or factored load.

Barrier Restraint Modifications

During the 10 year period from 1996 to 2006, 13 incidents have been documented (see Table 1) where standard automobiles impacted barrier walls, rails or restraints of parking garages with such force that the barrier systems failed resulting in the deaths of 16 people. A number of the accidents appear to have occurred when the driver hit the accelerator rather than the brake pedal. Most of the failures were in parking structures designed and built prior to the 1980 design recommendations or prior to the 1990 code requirement, and had inadequate barrier restraints including faulty installation of barrier cables and unreinforced masonry walls. Wheel stops or curbs used in many of these facilities were ineffective at stopping the vehicle. Those failures have caused the Parking Consultants Council of the National Parking Association to re-evaluate the design requirements for barrier rail systems.

The characteristics of the passenger vehicle have changed dramatically in the last 27 years. Approximately 50% of the passenger vehicles sold in 2006 consist of light trucks (less than 10,000 pounds Gross Vehicle Weight), vans or SUV's. Those vehicles have a bumper height well in excess of the 18 inch height of load application required by the current building code. An analysis of automobile sales data (see Table 2) indicates the current code requirement of 18 inches only covers 52% of the vehicles. A bumper height of 27 inches would cover 96% of passenger vehicles.

In addition to revising the bumper height used in designing barrier restraints for parking structures, the applied load may also need to be revised. Light trucks and SUV's are heavier than the typical automobile. The empty weight of a Lincoln Navigator, a large sport utility vehicle (SUV), is approximately 7,000 pounds. Some large pick-up trucks have gross (loaded) weights of up to 10,000 pounds.

Also, the speed at point of impact may have to be reconsidered. At least one of the failure incidents reported a speed of 10 to 14 mph compared to a speed of 5 mph used to determine the current load requirement.

Finally, the design methodology may have to be revised. The key to vehicle impact restraint design is to absorb and dissipate the kinetic energy created by the moving vehicle impacting the barrier. The kinetic energy is created by a combination of the vehicle speed or velocity and the vehicle weight where $KE=1/2mv^2$.

This energy is absorbed by a combination of:

- The weight of the resisting element such as a concrete bumper wall,
- the instantaneous elastic or plastic deflection of the wall,
- the crushing or movement of the vehicle components such as bumper energy absorption system, crushing of vehicle fenders, etc.

This is a complex dynamics problem—not unlike designing a building structure for an earthquake.

Summary

A review of the history of vehicle barrier restraint systems shows that systems designed for the 10,000 pound horizontal ultimate static impact load re adequate if proper provision is made to provide toughness and ductility in the barrier restraints and the related connection systems. The connections must be able to extend and deform to absorb impact energy prior to ultimate failure or disconnecting.

Strand or cable barrier systems can perform adequately if they are properly designed, installed, and maintained.

Recent vintage passenger vehicles including SUV's and pick-up trucks are heavier than their predecessors with average bumper heights greater than 18 inches. Loading and height adjustments should be made to provide proper barrier restraint for these heavier and taller vehicles.

Table 1. Parking Structure Vehicle Barrier Failure Incidents

	Facility Name & Location	Year of Incident	Year Built	Barrier Type	Description of Incident
1	Second & Union, Seattle, WA	1987	1969	Concrete curb and cables	3 dead from vehicle falling from fifth floor
2	Claridge Casino, Atlantic City, NJ	1996	1996	Cable Rail	2 dead in vehicle fall from 4th floor, faulty cable installation
3	Pittsburgh, PA	1999	1965	Wheel stops and 3' metal panel	Woman survived vehicle fall from 7th floor
4	Sandcastle Resort, Virginia Beach, VA	2000	1985	Concrete block wall	4 dead in vehicle fall from 5th floor
5	Howard Johnson's Hotel, Ocean City, MD	2002	Unknown	Wheel stops and Cable Rail	2 dead in vehicle fall from 4th floor
6	Golden Nugget, Las Vegas, NV	Jan. 2004	Unknown	Concrete curb and wall	2 dead in vehicle fall from 4th floor
7	City Park Mall, Ft. Lauderdale, FL	2004	1982	Concrete block wall	1 dead in vehicle fall from 5th floor
8	Golden Nugget, Las Vegas, NV	Oct. 2004	Unknown	Concrete curb and wall	2 seriously injured in vehicle fall from 2nd floor
9	Miami, FL	2004	Unknown	Concrete wall	Man injured in vehicle fall from 5th floor
10	Riverpark Square, Spokane, WA	2006	1973	Wheel stops and concrete spandrel wall	1 dead in vehicle fall from 5th floor
11	Lexington, KY	2006	1975	Precast concrete spandrels	Pedestrian killed on sidewalk when spandrel fell from garage after vehicle impact
12	Los Angeles, CA	2007	Unknown	Unknown	Woman injured in vehicle fall from 4th floor
13	Houston, TX	2007	Unknown	Masonry Wall	1 dead in vehicle fall from 5th floor
14	Chumash Casino, CA	2007	Unknown	Concrete Wall	Concrete wall damaged severly, but did not fail. No injuries.

Source: Parking Consultants Council of the National Parking Association, August 2007

Table 2. Bumper Height Analysis for 2007 Car, Truck, SUV and Minivan Models July 26th, 2007							
2007 Vehicle Models	Curb Weight (lb)	Payload (lb)	Gr. Veh. Wt (lb)	Bumper Middle Point Height (in)	2006 Vehicle Sales	Percentile	Notes
GMC Acadia	5,070	1,320	6,390	10	480	0.00%	
GMC Yukon XL	5,935	1,460	7,395	14	45,413	0.28%	
Dodge Ram 3500	6,588	2,300	8,888	14	182,089	1.37%	
GMC Sierra 1500	5,360	1,570	6,930	15	210,736	2.64%	
GMC Yukon	5,715	1,580	7,295	16	71,476	3.07%	
Lincoln Navigator	6,245	1,525	7,770	17	23,947	3.21%	
Mercedes-Benz R-Class	5,120	1,060	6,180	18	18,168	3.32%	
Car Models (175)	N/A	N/A	N/A	18	8,129,582	52.25%	Car Models (175), the current code requirement
Dodge Grand Caravan	4,515	1,185	5,700	19	211,140	53.53%	
Chrysler Town & Country	4,515	1,185	5,700	19	159,105	54.48%	
Mercedes-Benz M-Class	4,845	1,165	6,010	19	31,632	54.67%	
Honda Odyssey	4,615	1,320	5,935	19	177,919	55.74%	
Toyota Sienna	4,415	1,120	5,535	19	163,269	56.73%	
Chrysler Aspen	5,335	1,260	6,595	20	7,656	56.77%	
Ford Explorer	4,905	1,275	6,180	21	179,229	57.85%	
Chevrolet Express	5,015	3,254	8,269	22	123,195	58.59%	
Chevrolet Equinox	3,880	1,115	4,995	22	113,888	59.28%	
Chevrolet Trailblazer	4,830	1,020	5,850	23	174,797	60.33%	
Ford Econoline	5,505	3,215	8,720	23	180,457	61.42%	
Honda CRV	3,505	850	4,355	23	170,028	62.44%	
Ford Escape	3,575	950	4,525	23	157,395	63.39%	
Toyota RAV 4	3,485	825	4,310	23	152,047	64.30%	
GMC Sierra 2500	6,000	3,795	9,795	23	105,368	64.94%	
Cadillac Escalade	5,810	1,330	7,140	24	62,206	65.31%	
Chevrolet Avalanche	6,010	1,230	7,240	24	57,076	65.66%	
Chevrolet Suburban	5,935	1,460	7,395	24	77,211	66.12%	
Chevrolet Tahoe	5,715	1,580	7,295	24	161,491	67.09%	
Mercedes-Benz GL-Class	5,575	1,210	6,785	24	18,776	67.21%	
Volvo XC90	4,950	1,210	6,160	24	33,200	67.40%	
Toyota Highlander	4,035	1,160	5,195	24	129,794	68.19%	
Lexus RX	4,235	925	5,160	24	108,348	68.84%	
Toyota 4 Runner	4,345	1,035	5,380	24	103,086	69.46%	
Hummer H3	4,700	1,150	5,850	24	54,052	69.78%	
Chevrolet Silverado 1500	5,360	1,570	6,930	25	636,069	73.61%	
Dodge Durango	5,335	1,260	6,595	25	70,606	74.04%	
Dodge Ram 1500	5,300	1,350	6,650	25	182,089	75.13%	
Ford Expedition	6,245	1,570	7,815	25	87,203	75.66%	
Toyota Tundra	5,740	1,395	7,135	25	124,508	76.41%	
Volkswagen Touareg	5,210	1,280	6,490	25	10,163	76.47%	
Jeep Grand Cherokee	4,725	1,100	5,825	25	139,148	77.31%	
Nissan Pathfinder	4,875	1,125	6,000	26	73,124	77.75%	
Nissan Titan	5,380	1,105	6,485	26	72,192	78.18%	
Honda Pilot	4,535	1,320	5,855	26	152,154	79.10%	
Jeep Liberty	4,125	1,150	5,275	26	133,557	79.90%	
Ford F-150	5,620	1,510	7,130	27	398,020	82.30%	
Jeep Commander	5,245	1,100	6,345	27	88,497	82.83%	
Nissan Armada	5,715	1,375	7,090	27	32,864	83.03%	85th Percentile Vehicle
87 Additional Truck/SUV/Minivan Models	N/A	N/A	N/A	27	2,188,867	96.20%	87 Additional Truck/SUV/Minivan Models
Hummer H2	6,400	2,200	8,600	27	17,107	96.30%	
Ford F-250	8,080	1,905	9,985	28	398,020	98.70%	
Toyota Sequoia	5,280	1,320	6,600	28	34,315	98.91%	
Toyota Tacoma	4,115	1,100	5,215	28	178,351	99.98%	
Toyota Land Cruiser	5,435	1,240	6,675	29	3,376	100.00%	
Total 2006 Vehicle Sales					**16,614,484**		

Total Number of Vehicles	16,614,484	
Number of vehicles that would be included when using the 85th percentile bumper height	15,983,316	96%
Number of vehicles covered by the current requirement of 18 inches	8,681,891	52%
Number of vehicles not covered by the current code provisions	7,932,594	48%
Number of vehicles not covered by the proposed code Including data for the additional 87 models for LTVSUV's that are also 27 inches	631,169	4%

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

PART I – IBC GENERAL

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

PART II – IBC STRUCTURAL

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

G78–07/08
406.3.3.2 (New)

Proponent: Donald R. Monahan, Walker Parking Consultants, representing the Parking Consultants Council of the National Parking Association

Add new text as follows:

406.3.3.2 Openings below grade. Where area wells with openings below grade provide the required natural ventilation, the outside horizontal clear space measured perpendicular to the opening shall be equal to the aggregate height of the below-grade openings.

Reason: It is often desirable to achieve an open parking garage classification for garages that are partially or entirely below grade. In order to accomplish this goal, designers will include an area well around the perimeter of the structure to achieve natural ventilation to the below grade levels and provide the openings required at the below grade levels in accordance with 406.3.3.1. This proposed code change defines the width of the area well that should be provided.

Introducing natural light and natural ventilation into a below grade parking structure is a desirable user amenity. In addition, there is potential savings in the cost of the garage as open parking garages are less costly to construct compared to enclosed parking garages. Per 2007 R.S. Means Square Foot Costs, the average cost of a 450-car (145,000 sf), five-level open parking garage above grade is approximately $40 per sf. A comparable underground parking garage has an estimated cost of $63 per sf. Further, natural ventilation reduces energy cost by eliminating the need for motorized equipment to provide mechanical ventilation. This design approach is consistent with the increased emphasis on green buildings and LEED certification.

The proposed change preserves the aperture of the vertical opening with a horizontal area well of the same dimension that facilitates air flow through the open parking structure. If there are multiple levels below grade, one must add the height of the opening at each level to arrive at the required width of area well. For instance, if there were 3 levels below grade each with a 4 foot high opening, then the aggregate width of opening required is 12 feet at the top, 8 feet at the second level below grade and 4 feet at the third level below grade.

Walker Parking Consultants has designed hundreds of projects with area wells as little as 5 feet wide to 10 feet wide for two to three levels of parking below grade at 10 to 11-foot floor heights. The following projects were constructed in hillsides with area wells meeting the recommended width requirement. We are not aware of any issues with dispersion of vehicle emissions in those facilities.

Seattle Central Community College
Seattle, WA
1986
Area: 139,530
Number of Bays: 3.0
Number of levels: 4.0 (2 below grade)
Number of spaces: 500

University of Arkansas Harmon Street
Fayetteville, AR
2002
Area: 736,050
Number of levels: 9.0
Number of spaces: 2,149

St. Mary's Hospital Employee Garage
Rochester, MN
1989
Number of Bays: 4.0
Number of levels: 6.0
Number of spaces: 1,202

University of California
Santa Barbara, CA
1997
Number of Bays: 3.0
Number of levels: 4.0
Number of spaces: 905

University of Delaware Academy Street
Newark, DE
1997
Number of levels: 3.0
Number of spaces: 503

University of Michigan Glen Avenue
Ann Arbor, MI
1987
Number of Bays: 4.0
Number of levels: 7.0
Number of spaces: 1,033

University of Colorado
Boulder, CO
1991
Number of Bays: 3
Number of levels: 3 (2 below grade)
Number of spaces: 415

University of Colorado at Colorado Springs
Colorado Springs, CO
2002
Number of Bays: 3
Number of levels: 5 (2 below grade)
Number of spaces: 800

St. Lukes Regional Medical Center
Boise, ID
1998
Number of Bays: 3
Number of levels: 3 (2 below grade)
Number of spaces: 417

Figure 1. St Lukes Regional Medical Center

Figure 2. University of Colorado at Colorado Springs

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

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

G79–07/08
406.3.6

Proponent: Jason J. Krohn, PE, Precast/Prestressed Concrete Institute

Revise as follows:

406.3.6 (Supp) Area and height increases. The allowable area and height of open parking garages shall be increased in accordance with the provisions of this section. Garages with sides open on three-fourths of the building's perimeter are permitted to be increased by 25 percent in area and one tier in height. Garages with sides open

around the entire building's perimeter are permitted to be increased by 50 percent in area and one tier in height. For a side to be considered open under the above provisions, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier. For purposes of calculating the interior area of the side, the height need not exceed 6 feet (1829 mm).

Allowable tier areas in Table 406.3.5 shall be increased for open parking garages constructed to heights less than the table maximum. The gross tier area of the garage shall not exceed that permitted for the higher structure. At least three sides of each such larger tier shall have continuous horizontal openings not less than 30 inches (762 mm) in clear height extending for at least 80 percent of the length of the sides and no part of such larger tier shall be more than 200 feet (60 960 mm) horizontally from such an opening. In addition, each such opening shall face a street or yard accessible to a street with a width of at least 30 feet (9144 mm) for the full length of the opening, and standpipes shall be provided in each such tier.

Open parking garages of Type II construction, with all sides open, shall be unlimited in allowable area where the building height does not exceed 75 feet (22 860 mm). For a side to be considered open, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier. For purposes of calculating the interior area of the side, the height need not exceed 6 feet (1829 mm). All portions of tiers shall be within 200 feet (60 960 mm) horizontally from such openings or other natural ventilation openings as defined in Section 406.3.3.1. These openings shall be permitted to be provided in courts with a minimum width of 30 feet (9144 mm) for the full width of the openings.

Reason: In order for a side to be considered open, the area of the openings along the side must be at least 50% of the interior area. While the "interior area" is not defined, many building officials interpret this to mean the product of the length of the side and the ceiling height. In most cases the "ceiling" is the underside of the floor system above, with stems of concrete double-tees or beams projecting below it. Since the minimum clear height permitted in a parking garage is 7 feet (see Sections 406.2.2 and 406.3.5.1), in order to provide the required clear height below the bottom of beams or stems, the height from the top of the floor to underside of the floor above needs to be approximately 9 feet. If the underside of the double tee flange is considered to be the "ceiling", the height of the required continuous opening above the 42" solid guard must be at least 5 feet. This means the top of the opening will be at least 8.5 feet (3.5 + 5 = 8.5) above the floor and about one foot above the bottom of the double tee stems. Parking garages are generally designed so that the double tees span perpendicular to the long wall, and a common construction technique is to support the bearing ends of the stems on corbels or ledges constructed as a part of spandrel beams. An opening extended one foot above the bottom of the double tee stem will encroach upon this bearing support. The only way to provide the additional one foot of opening height is to lower the guard, in which case the openings would need to be 57% (2/3.5 = 0.57) of the area of the guard. Obviously a guard with openings is less desirable than one that is solid, and will most likely cost more to construct.

It is being suggested that permitting the interior area to be calculated based on a height not to exceed 6 feet will provide adequate openings to adequately ventilate the open parking garage should a fire occur. The actual height in excess of 6 feet above the floor provides space for the smoke to accumulate above the heads of most occupants. There are at least two precedents in the code for requiring that a smoke layer be kept a minimum of 6 feet above the floor. The first is in Section 909.8.1 for smoke control provided by the exhaust method for large enclosed volumes, such as atriums and malls, and the second is in Section 1025.6.2.1 for smoke-protected assembly seating.

It should be pointed out that in the example described above, some openings will still need to be provided in the guard in order to meet the revised requirements.

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

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

G80–07/08
406.3.6

Proponent: Raymond A. Grill, PE, Arup, representing himself

Revise as follows:

406.3.6 (Supp) Area and height increases. The allowable area and height of open parking garages shall be increased in accordance with the provisions of this section. Garages with sides open on three-fourths of the building's perimeter are permitted to be increased by 25 percent in area and one tier in height. Garages with sides open around the entire building's perimeter are permitted to be increased by 50 percent in area and one tier in height. For a side to be considered open under the above provisions, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier.

Allowable tier areas in Table 406.3.5 shall be increased for open parking garages constructed to heights less than the table maximum. The gross tier area of the garage shall not exceed that permitted for the higher structure. At least three sides of each such larger tier shall have continuous horizontal openings not less than 30 inches (762 mm) in clear height extending for at least 80 percent of the length of the sides and no part of such larger tier shall be

more than 200 feet (60 960 mm) horizontally from such an opening. In addition, each such opening shall face a street or yard accessible to a street with a width of at least 30 feet (9144 mm) for the full length of the opening, and standpipes shall be provided in each such tier.

Open parking garages of Type II construction, with all sides open, shall be unlimited in allowable area where the building height does not exceed 75 feet (22 860 mm). For a side to be considered open, the total area of openings along the side shall not be less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier. All portions of tiers shall be within 200 feet (60 960 mm) horizontally from such openings or other natural ventilation openings as defined in Section 406.3.3.1. These openings shall be permitted to be provided in courts with a minimum ~~width~~ dimension of ~~30~~ 20 feet (~~9144~~ 6096 mm) for the full width of the openings.

Reason: There was no technical basis for the 30 foot width when it was added to the code. It was noted as a conservative number. The Code currently provides a basis for the 20 width. Footnote d to Table 704.8 allows unlimited unprotected openings when the fire separation is 10 foot or greater. A 20 foot minimum dimension for a court may still be a conservative number, but at least correlates with other provisions in the code.

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

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

G81–07/08
407 (New)

Proponent: Tom Lariviere, Fire Department, Madison, MS, representing the Joint Fire Service Review Committee

THIS PROPOSAL IS ON THE AGENDA OF THE IBC MEANS OF EGRESS CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THE IBC MEANS OF EGRESS CODE DEVELOPMENT COMMITTEE.

Add new text as follows:

SECTION 407
GROUP I-1

407.1 General. Occupancies in Group I-1 shall comply with the provisions of this section and other applicable provisions of this code.

407.2 Means of egress. Except as modified or as provided for in this section, the provisions of Chapter 10 shall apply.

407.2.1 Lockable patient room doors. All patient room doors including bathroom doors that are lockable from within shall be openable from ingress side by staff during an emergency.

(Renumber subsequent sections)

Reason: This proposal will provide a method for the I-1 staff to access areas where patients may be during an emergency. The staff needs to be able to enter the patient room and assist the patient for either a medical emergency, or for evacuation from the building. It does not make any sense to require staffing if the staff has no access to the patients they are assigned to assist.

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

Analysis: A question would be if this requirement should be located in Section 1008.1.8 *Door operation.*

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

G82–07/08
407.8 (New), Chapter 35 (New)

Proponent: Tom Lariviere, Fire Department, Madison, MS, representing the Joint Fire Service Review Committee

1. Add new text as follows:

407.8 Hyperbaric facilities. Group I-2 occupancies containing hyperbaric equipment shall meet the requirements contained in Chapter 19 of NFPA 99.

2. Add standard to Chapter 35 as follows:

NFPA

99–05 Standard for Health Care Facilities

Reason: This proposal will provide a reference standard and guidance for the installation of hyperbaric chambers into Group I-2 occupancies. This will only apply to Group I-2 occupancies and then only when a hyperbaric chamber is installed. This proposal will provide guidance for the designer and the code official regarding the installation and construction of the room containing hyperbaric chambers.

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

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

G83 –07/08
408.1.1 (New)

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Add new definition as follows:

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

SALLYPORT. A security vestibule with two or more doors or gates where the intended purpose is to prevent continuous and unobstructed passage by allowing the release of only one door or gate at a time.

Reason: The term sallyport is used in Section 408 IBC but is not defined. This definition clarifies what is meant by the term sallyport. This section applies to Group I-3 and associated occupancies only.

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

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

G84–07/08
408.2

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Revise as follows:

408.2 (Supp) ~~Mixed~~ Other occupancies. Buildings or portions of buildings ~~with an occupancy in Group I-3 that are classified~~ in Group I-3 occupancies where security operations necessitate the locking of required means of egress shall be permitted to be classified as a different occupancy. Occupancies classified as other than Group I-3 shall meet the applicable requirements of this code for that ~~such~~ occupancy ~~occupancies . Where security operations necessitate the locking of required means of egress,~~ provided provisions ~~shall be~~ are made for the release of occupants at all times. Where the provisions of this code for occupancies other than Group I-3 are more restrictive than the provisions for Group I-3 occupancies, the Group I-3 occupancy provisions shall be permitted to be used.

Means of egress from detention and correctional occupancies that traverse other use areas shall, as a minimum, conform to requirements for detention and correctional occupancies.

Exception: It is permissible to exit through a horizontal exit into other contiguous occupancies that do not conform to detention and correctional occupancy egress provisions but that do comply with requirements set forth in the appropriate occupancy, as long as the occupancy is not a Group H use.

Reason: The purpose of the change is to clarify the existing provision to make it clear that buildings or portions of buildings in detention and correctional facilities where the doors are locked but otherwise the classification would be a different occupancy (Groups A, E, F, S, B, etc.) may be classified as the occupancy they fall under provided the occupants can exit in an emergency. The IBC Commentary and ICC Interpretation No. 2/308/98 already state this is the intent of the provision. New language is added to permit the use of any Group I-3 provisions which are less restrictive than the provisions of the occupancy in which the building is classified, with the caveat that such provisions may be prohibited from being used by other provisions of the code. While there are no specific prohibitions currently in the code, several proposals being submitted in conjunction with this proposal would provide specific prohibitions, such as the proposal to allow security glazing in smoke barriers in Group I-3 occupancies. Language was added to that proposal to limit its application to only occupancies associated with Group I-3 and not permit it to apply to other occupancies in the Code.

The proposal is necessary to permit building and portions of buildings in detention and correctional facilities which do not otherwise fall into the Group I-3 classification to be constructed at the least possible cost while providing the necessary safeguards and security to assure the safety of the occupants.

Cost Impact: The code change will not increase and may decrease the cost of construction.

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

G85 –07/08
408.3.7 (New)

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Add new text as follows:

408.3.7 Guard tower doors. A hatch or trap door not less than 16 square feet (610 m^2) in area through the floor and having minimum dimensions of not less than 2 feet (610 mm) in any direction shall be permitted to be used to access guard towers.

Reason: This provision is necessary to allow the use of trap doors in the floor of an observation point with limited size access and occupancy as a means of ingress and egress. In order to provide the 360-degree visibility and maximum mobility necessary for guard observation stations, the size of the base of such elevated stations must be kept to a minimum. Security is increased without risk to either the general public or the inmates, since access to these spaces is restricted to prison staff personnel.

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

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

G86 –07/08
408.5

Proponent: Don Lee, DLR Group, representing himself

Delete and substitute as follows:

~~**408.5 Vertical openings.** Vertical openings shall be enclosed in accordance with Section 707.~~

~~**Exception:** A floor opening between floor levels of residential housing areas is permitted without enclosure protection between the levels, provided that both of the following conditions are met:~~

1. ~~The entire normally occupied areas so interconnected are open and unobstructed so as to enable observation of the areas by supervisory personnel.~~
2. ~~Means of egress capacity is sufficient to provide simultaneous egress for all occupants from all interconnected levels and areas.~~

~~The height difference between the highest and lowest finished floor levels shall not exceed 23 feet (7010 mm). Each story, considered separately, has at least one-half of its individual required means of egress capacity provided by exits leading directly out of that story without traversing another story within the interconnected area.~~

408.5 Protection of vertical openings. Vertical openings shall be protected in accordance with Section 408.5.1 through 408.5.3.

408.5.1 Vertical opening enclosure. Any vertical openings shall be enclosed in accordance with Section 707 except as provided by 408.5.2 or 408.5.3.

408.5.2 Atriums. Atriums complying with 404 shall be permitted.

408.5.3 Floor openings. A floor opening between floor levels of residential housing areas is permitted without enclosure protection between the levels, provided the following conditions are met:

1. The entire normally occupied areas so interconnected are open and unobstructed so as to enable observation of the areas by supervisory personnel.
2. Means of egress capacity is sufficient to provide simultaneous egress for all occupants from all interconnected levels and areas.
3. The height difference between the highest and lowest finished floor levels shall not exceed 23 feet (7010 mm). Each floor level, considered separately, shall have at least one-half of the required means of egress capacity provided by exits leading directly out of that floor level without traversing another floor level within the interconnected area.

   Exception: When the height difference between the highest and lowest finished floor levels does not exceed 13 feet (7010 mm) egress may traverse another floor level in the interconnected area.

Reason: This change is intended to clarify the exiting from floor levels within the residential housing units. Without this change the "floor levels" get treated as stories and additional exits are required. Currently a residential housing unit with two floor levels and a very small occupant load can be required to have three exits which in a detention facility is problematic. This change would then allow the two level units to have just two exits with no direct egress from the upper floor level as long as common path and travel distances are met. The figures below illustrate the proposal and should be included in the commentary.

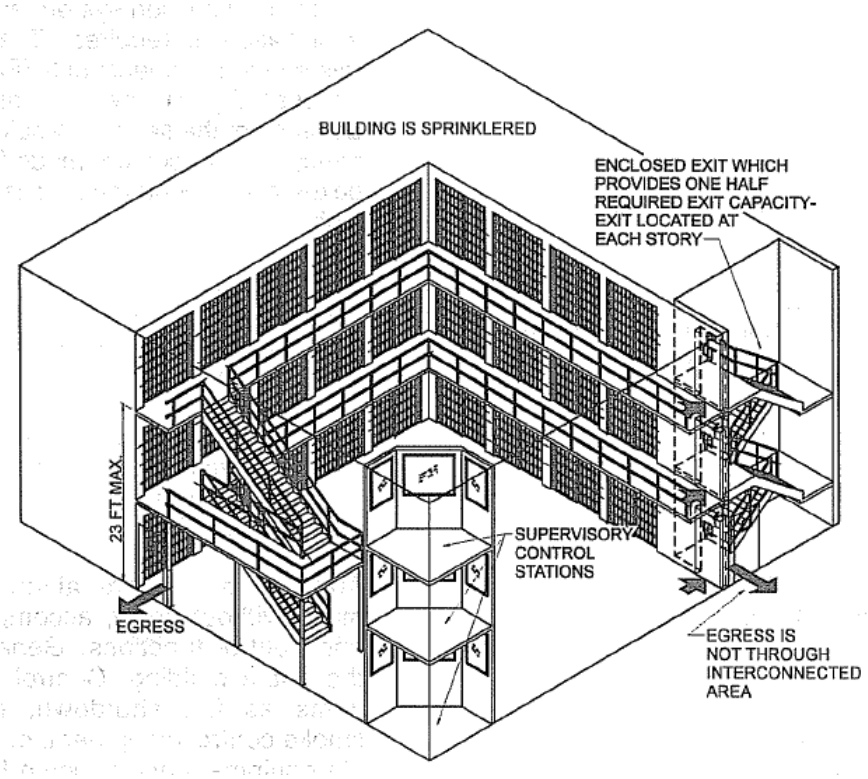


FIGURE 1 – 408.5.3 Item 3
MULTILEVEL RESIDENTIAL HOUSING WITHOUT VERTICAL OPENING ENCLOSURE

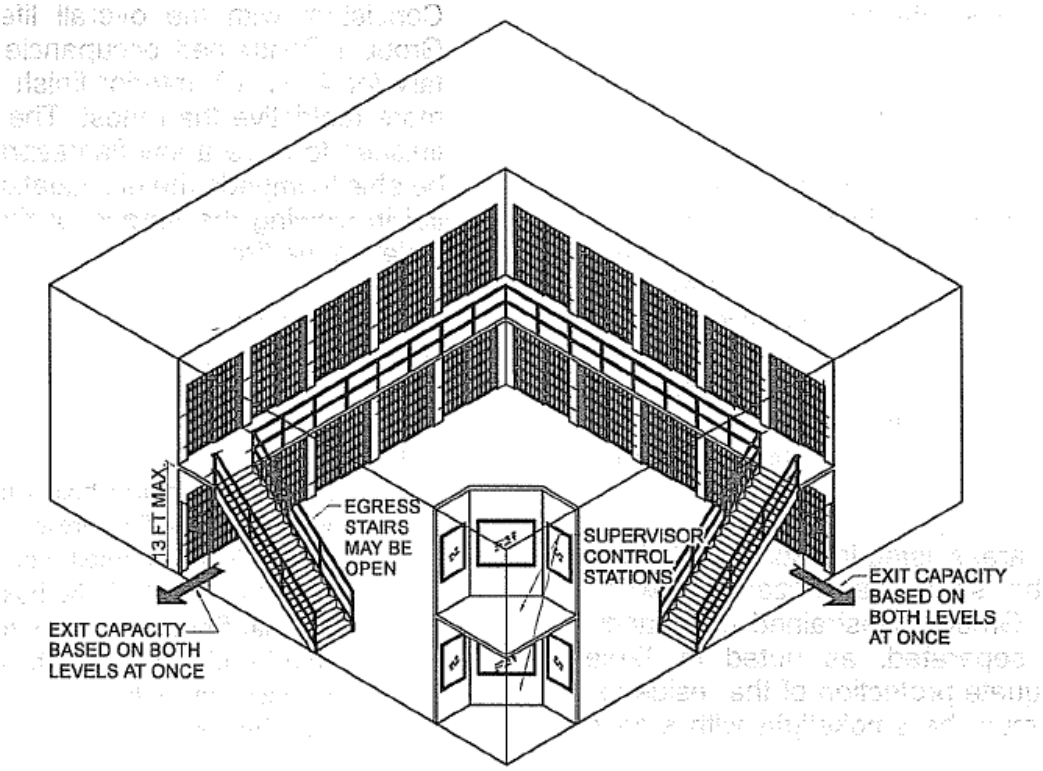


FIGURE 2 – 408.5.3 Item 3
EXCEPTION TO 408.5.3.3

Bibliography:
2006 NFPA 101, Life Safety Code, 22.2.5.1, 22.3.1, National Fire Protection Association
1999 *Standard Building Code*, 409.2.7, International Code Council
1999 *Standard Building Code* Commentary, 409.2.7, International Code Council, Figures for the code change
1997 *Uniform Building Code*, Appendix Chapter 3, Division 1 – Detention & Correctional Facilities, ICBO

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

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

G87 –07/08
408.5.1 (New)

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Add new text as follows:

408.5.1 Noncombustible shaft openings in communicating floor levels. Where vertical openings are permitted without enclosure protection in accordance with Section 408.5, noncombustible shafts serving floor levels within the story such as plumbing chases for individual cells at different levels within the story shall also be permitted without enclosure protection. Where additional stories are located above or below, the shaft shall be permitted to continue with fire and smoke damper protection provided at the fire resistance rated floor/ceiling assembly between the non-communicating stories.

Reason: Section 408.5 permits floor openings between floor levels of residential housing areas without enclosure protection between the levels provided the areas are open and egress capacity is sufficient. In such areas, it makes no sense to require a plumbing or mechanical chase to have to meet the shaft requirements as the floor areas are already open to each other. This proposal simply adds a subsection which recognizes that there is no need for such shafts to be protected at those levels. Should the chase continue to other floors which are not open to each other, this new subsection would require protection at the rated floor/ceiling assembly separating the non-communicating floors.

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

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

G88–07/08
408.6.4 (New)

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Add new text as follows:

408.6.4 Fire barriers. Windows and doors in fire barriers with a fire resistance rating of 1 hour constructed in accordance with Section 706 shall be permitted to have security glazing installed provide that the following conditions are met.

1. The total area of glazing at each floor level shall not exceed 5,000 square inches (3 m^2) and individual panels of glazing shall not exceed 1,296 square inches (0.84 m^2).
2. The glazing shall be protected on both sides by an automatic fire sprinkler system. The sprinkler system shall be designed to wet completely the entire surface of any glazing affected by fire when actuated.
3. The glazing shall be in a gasketed frame and installed in such a manner that the framing system will deflect without breaking (loading) the glass before the sprinkler system operates.
4. Obstructions, such as curtain rods, drapery traverse rods, curtains, drapes or similar materials shall not be installed between the automatic sprinklers and the glazing.

Reason: This change extends the methodology already permitted for glazing in exit enclosures to security glazing in fire barriers in Group I-3 occupancies. The glazing would not have to meet the requirements of Section 715, Opening protectives, but would have equivalent protection through the limitations of condition numbers 1-4 which require protection through the use of an automatic sprinkler (deluge) system and which limit the size of the glazing and provide other conditions. The change is necessary to track and contain inmate movement for the protection of other inmates and administrative personnel. This change would be applicable to other occupancies in detention and correctional occupancies accordance with Section 408.2.

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

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

G89–07/08
408.8

Proponent: A. Brooks Ballard, Virginia Department of Corrections

Revise as follows:

408.8 Windowless buildings. For the purposes of this section, a windowless building or portion of a building is one with nonopenable windows, windows not readily breakable or without windows. Windowless buildings shall be provided with an engineered smoke control system to provide ~~ventilation (mechanical or natural)~~ a tenable environment for exiting from the smoke compartment in the area of fire origin in accordance with Section 909 for each windowless smoke compartment.

Reason: Because of the security requirements in jails and prisons, safety for both inmates and the public requires a “defend in place” philosophy. This change is necessary for the safety of the public, of the facility employees and the inmates themselves. In an incident, doors and locks must be opened by administrative action for the inmates to be moved. Employees may have to go into the area of origin to rescue inmates, to break up fights or to release door locks. Of the three engineered smoke control systems indicated in Section 909, only Section 909.8, Exhaust Method, requires a tenable environment in the area of origin. A tenable environment is necessary for the safety and liability issues inmate to I-3 occupancies.

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

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

G90–07/08
410.3.4

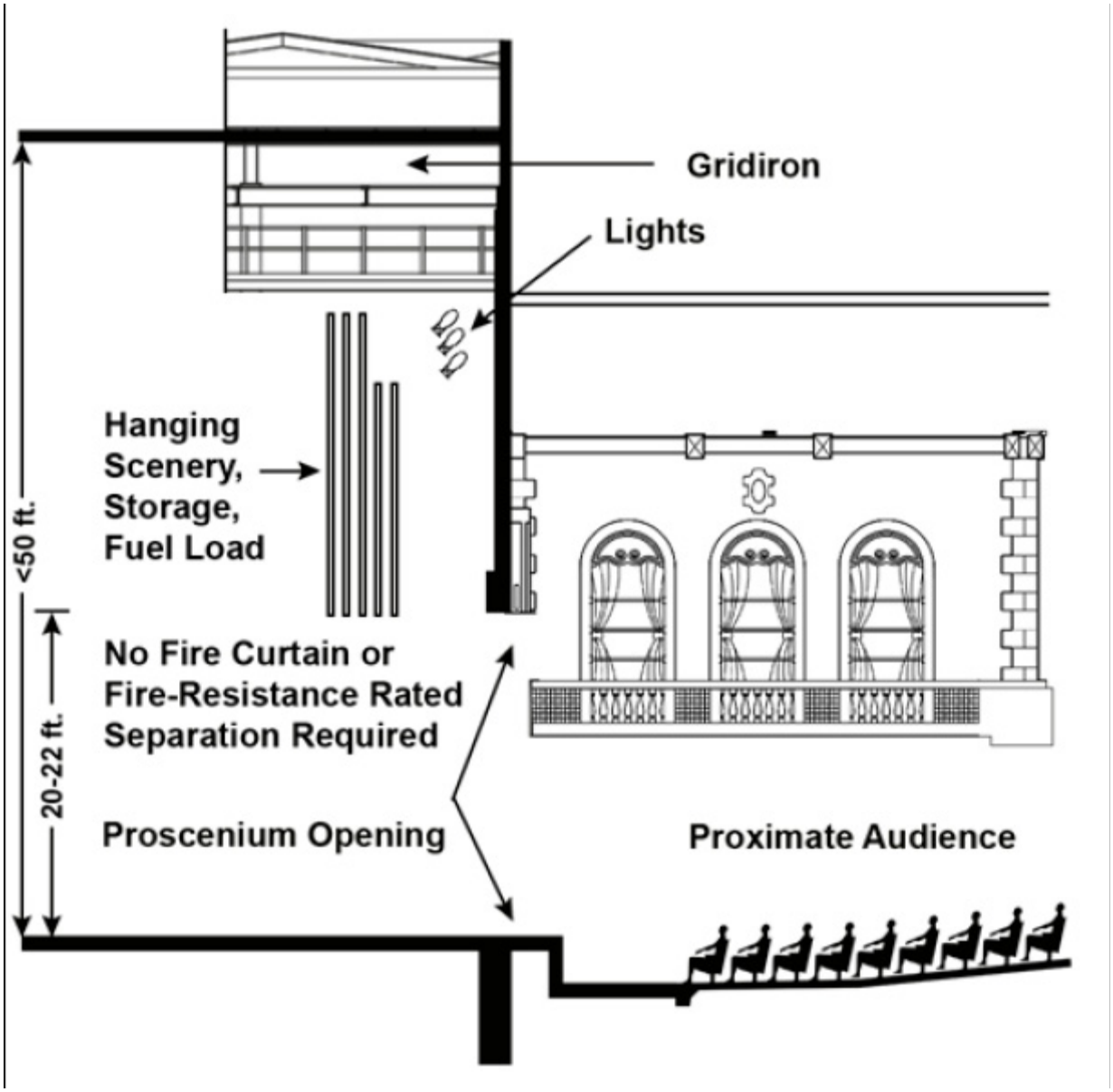
Proponent: Gregory J. Cahanin, Cahanin Fire and Code Consulting, representing himself

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.

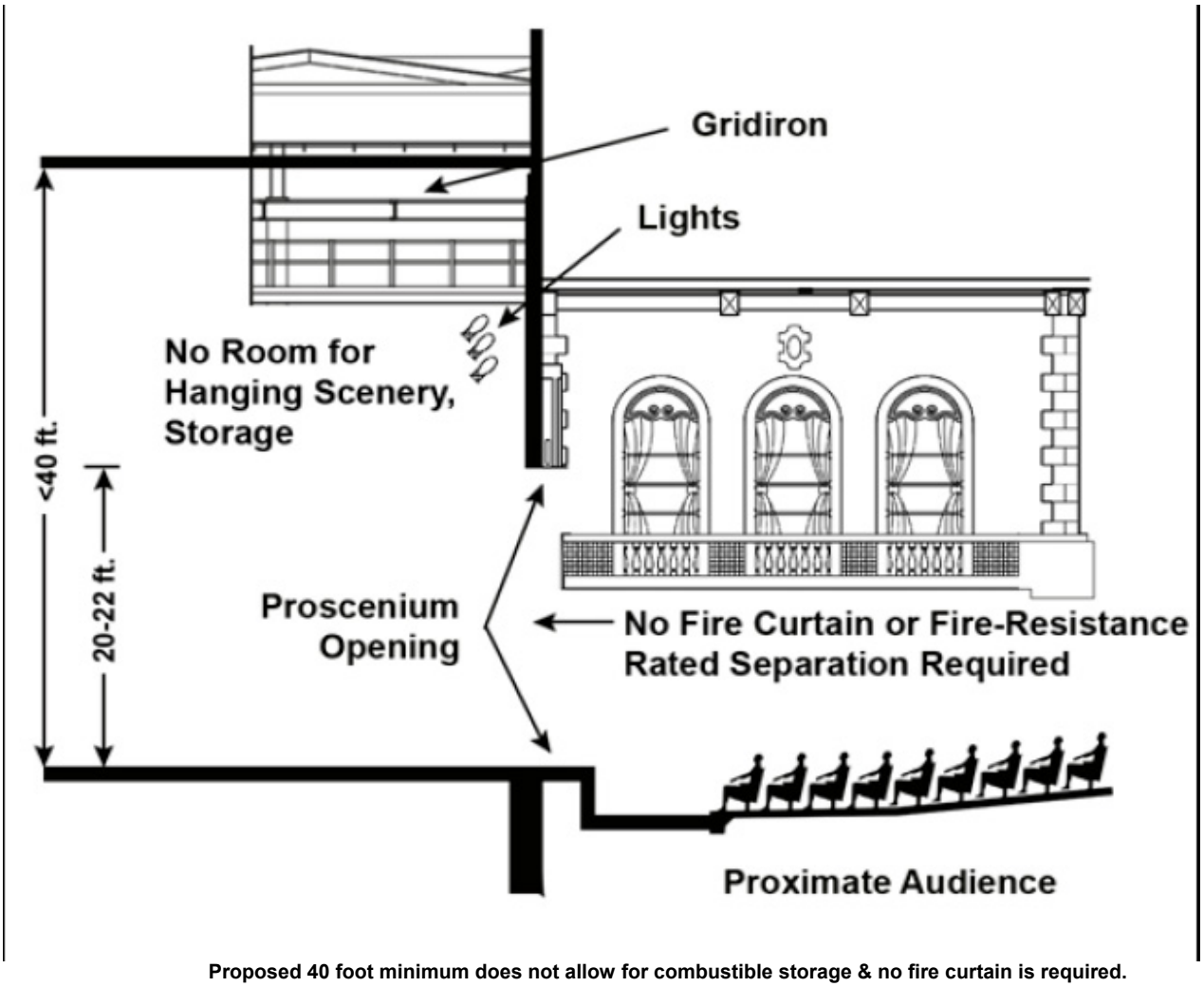
Reason: The change lowers the proscenium-opening threshold where a fire barrier between the audience and the stage must be constructed. This will also become the threshold at which a fabric fire curtain or deluge water spray system is also installed in the proscenium opening.

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.



Existing <50 foot stage height allows for combustible storage above the stage and no fire curtain.

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.



Proposed 40 foot minimum does not allow for combustible storage & no fire curtain is required.

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.

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

G91 –07/08
410.3.4

Proponent: James C. Gerren, Clark County Department of Development Services, NV

Revise as follows:

410.3.4 Proscenium wall. Where the stage height is greater than 50 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.

Exception. Where a stage is located in a building of Type I construction, the proscenium wall shall be permitted to extend continuously from the 2-hour fire-resistance rated floor slab of the space containing the stage to the roof or floor deck above.

Reason: The purpose of the proposed code change is to clarify the code.

Stages in theaters and showrooms are often located in mixed-use facilities, not necessarily dedicated buildings. In such facilities, stages are typically not located in a space in which the floor is also the foundation of the building. On the contrary, in most mixed-use facilities that contain a stage that requires a proscenium wall, there are typically one or more occupied floor levels beneath the theater or showroom containing the stage. The current language of IBC Section 410.3.4 would require the proscenium wall for these stages to dissect the entire height of the building even though the stage is only located in a single space within the building. The proposed code change would allow the proscenium to terminate at the 2-hour fire-resistance rated floor assembly of the space containing the stage. The proposed code change would only apply to stages in buildings of Type I construction since such buildings are required by IBC Table 601 to always have minimum 2-hour fire-resistance rated floor construction.

The intent of the proscenium wall required by Section 410.3.4 is to protect the audience from the potentially increased hazard on stages with heights greater than 50 feet, which permits multiple settings and large amounts of scenery in dense configurations (i.e., an increased fuel load). The proposed code change still meets the intent of Section 410.3.4, and there is precedence for allowing the 2-hour fire-resistance rated proscenium wall to terminate at a 2-hour fire-resistance floor assembly. Section 1022.2 requires horizontal exit separations to extend vertically through all levels of the building unless floor assemblies have a minimum fire-resistance rating of 2-hour with no unprotected openings. The proposed code change provides a similar allowance to that provided in Section 1022.2 for horizontal exit separations.

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

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

G92–07/08

411.7, 411.7.1 (New)

Proponent: Bob Eugene, Underwriters Laboratories Inc.

THIS PROPOSAL IS ON THE AGENDA OF THE IBC MEANS OF EGRESS CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE

Revise as follows:

411.7 (Supp) Exit marking. Exit signs shall be installed at the required exit or exit access doorways of amusement buildings in accordance with this section and in accordance with Section 1011. Approved directional exit markings shall also be provided. Where mirrors, mazes or other designs are utilized that disguise the path of egress travel such that they are not apparent, approved and listed low-level exit signs that comply with Section 1011.4, and directional path markings listed in accordance with UL 1994, shall be provided and located not more than 8 inches (203 mm) above the walking surface and on or near the path of egress travel. Such markings shall become visible in an emergency. The directional exit marking shall be activated by the automatic fire detection system and the automatic sprinkler system in accordance with Section 907.2.11.2.

411.7.1 Externally illuminated exit signs. Where demonstrated to be reliable and sufficient and where approved, externally illuminated exit signs shall be permitted to be installed.

Reason: The proposed change includes the requirement that it meet the exit sign requirements of section 1011. By including this reference the exit sign will clearly provide the use of the different types, duration and listing for the exits signs. As new technology for the illumination of the exit signs changes, so should be code sections that regulate them. The language in the IBC section 1011.4 includes the new self-luminous and photoluminescent exit sign types. The new Section 411.7.1 provides direction for this new type of exit sign. In some situations, not all types of signs can be used and adding this new section highlights the need to assess the normal lighting levels in the area it is to be installed. This is so that in areas with normal low lighting, a sign that depends on normal light levels might not be appropriate for some type of signs, such as the photoluminescent type signs.

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

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