CTC Elevator Lobby Study Group

10/7/2011

The following is the Study Group report that was considered by the CTC at its October 13-14, 2011 meeting. Notes from the meeting are indicated in red.

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2. **TG2 Proposals**
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Draft Technical Analysis of the Need for Enclosed Elevator Lobbies

Prepared for the ICC CTC by the Elevator Lobby Study Group

CTC Proposals on Enclosed Lobbies for Elevators

Background

One of the fundamental objectives of fire safety in buildings is to limit the spread of fire and its effects (heat, smoke, and toxic gasses) to the greatest extent possible. This is usually accomplished by limiting the ignitability and burning rate of materials by physical barriers (compartmentation) and by suppression (automatic and/or manual). In specific areas where it is most critical to prevent direct exposure of building occupants that might injure or interfere with evacuation, physical barriers may be supplemented by active or passive smoke control.

The driving force that moves smoke and fire gasses around a building is differences in temperature (and resulting differences in density) resulting from the fire and from the fact that the environment in many buildings is heated or cooled for comfort. Air flows resulting from these temperature differences increase with increasing difference in temperature and in relation to the area of openings (including visible and hidden gaps and cracks) between spaces at different temperature.

One of the early lessons learned from fire disasters is the need to protect shafts that can act as "chimneys," carrying heat, smoke, and gasses to remote areas of a building. Smoke and fire spread up hoistways and stairways accessed through non-rated doors had been implicated as early as in 1911 in the 146 fatalities at the Triangle Shirtwaist Fire [Sunderland 2011]. Other significant fires that involved smoke and fire spread up stairways and hoistways include the Equitable Building Fire, New York, NY, January 9, 1912; and the MGM Grand Hotel, Las Vegas, NV, November 21, 1980. There are also a few examples of properly designed and constructed stairways that were compromised during a fire by doors that were propped open. These include the Prudential Building, Boston, MA, January 1986, and the Cook County Office Building, Chicago, IL, October 17, 2003.

Sprinklered Buildings

A key observation in each of these major fires is that the buildings (or at least the areas where the fires occurred) were unsprinklered. The discharge of water from operating sprinklers not only suppresses or extinguishes the fire, limiting the quantities and dynamics of the smoke, but also cools the air temperatures to near ambient levels. Even in the cases of fires shielded from the sprinkler spray, temperatures are low while smoke and fire gas release rates can be increased due to incomplete combustion. Thus, in sprinklered buildings, there is little driving force to generate and move dangerous quantities of smoke and gasses around the building by way of stairways or hoistways.

Sprinkler Reliability

The definitive source for data on sprinkler system reliability is Dr. John Hall at NFPA. According to his latest report [Hall, 2010] on the US experience with sprinklers,

> *"Sprinklers (of all types) operated in 91% of all reported structure fires large enough to activate sprinklers, excluding buildings under construction and buildings without sprinklers in the fire area.* When sprinklers operate, they are effective 96% of the time, resulting in a combined performance of operating effectively in 87% of all reported fires where sprinklers were present in the fire area and fire was large enough to activate them. The combined performance for the more widely used wet pipe sprinklers is 88%,…"*

Across all structures, wet-pipe sprinklers operate 92% of the time. The top reasons for non-operation are:

- 43% of failures to operate were attributed to the systems being shut off,
- 16% were because manual intervention defeated the equipment,
- 12% were because water was discharged but did not reach the fire,
- 8% were because not enough water was discharged,
- 8% were because of lack of maintenance,
- 6% were because the equipment was inappropriate for the type of fire, and
- 6% were because a component was damaged.

Many of these failure mechanisms identified in the fire records have been mitigated through recent improvements in building code requirements and the applicable design standard, NFPA 13, "*Standard for the Installation of Sprinkler Systems,*" effectively "designing-out" the typical failure mechanisms. "Equipment shut off" typically refers to water supply valves being closed, either to the entire system or to the portion of the system in the area of origin. Valves can be electronically monitored (requiring a fire alarm system) but securing with a chain and lock is common, and permitted by NFPA 13. "Chain not reinstalled" is a common failure mode, but electronic monitoring cannot be defeated easily since these systems are required to signal tampering to a constantly-attended location. The International Building Code (IBC) Section 903.4 requires electronic monitoring of all valves with a fire alarm control unit that transmits a distinctive signal to an approved location. Chains and locks permitted to secure valves by NFPA 13 are not permitted by the IBC. In addition, requirements in the IBC for automatically transmitting an alarm upon sprinkler system activation to a constantly-attended location will result in a greater level of reliability than the data set included in the Hall study.

"Manual intervention" is not a failure of importance because the fire was extinguished by hose or fire extinguisher and is no longer producing heat, smoke or gas. "Water discharged but did not reach the fire" is also not significant because the sprinkler spray cools the environment and, even though smoke and gasses are produced, fires remain relatively small. The low air temperatures minimize the driving forces that push the fire products to and up building shafts. "Not enough water discharged" usually refers to systems that ran out of water too soon, such as when too many sprinklers open. Recent

changes in NFPA 13, requiring hydraulically-designed systems and faster-operating sprinklers have greatly reduced the likelihood of such occurrences when compared to the universe of sprinkler systems installed over the last one hundred years. In any case, the effect would be similar to "water discharged but did not reach the fire" because significant cooling occurs even where it is not sufficient to extinguish the fire. "Inappropriate for the type of fire" is most common in storage occupancies where the commodity for which the system was designed was replaced with a commodity that required a higher water density, and the system was not upgraded. Such failures are not typical in high-rise residential and office buildings.

Based on this analysis, only "lack of maintenance" and "component damaged" would be of significance for failure of systems that are electronically monitored, resulting in an estimated reliability of 98.9%. This reliability rate is also consistent with the reliability data published by Marryatt for commercial office and residential occupancies in which he studied electrically-supervised sprinkler systems having flow and tamper signals automatically transmitted off-site. [Marryatt, 1971] See also the section on effectiveness of fire safety systems.

Notes: Suggest no putting in the 98.9% reliability. This is an assumption that is not applicable for a risk analysis. This is a point to argue against that could be avoided. Include deaths and injuries in sprinklered and non-sprinklered buildings.

Stack Effect

Stack effect is defined as air flow in shafts induced by indoor-to-outdoor temperature differences that lead to density differences and flow. By convention, stack effect flows are upwards when outdoor temperatures are colder than indoors, and reverse stack effect is a downward flow observed when outdoor temperatures are warmer than indoors. The upward flow results when air from lower floors is drawn into the shaft and flows out on upper floors. Thus, there exists a height in the building at which there is no flow into or out of the shaft, which is called the "neutral plane." Flow rates increase with height above and below the neutral plane. This is illustrated for normal (upward) stack effect in Figure 1.

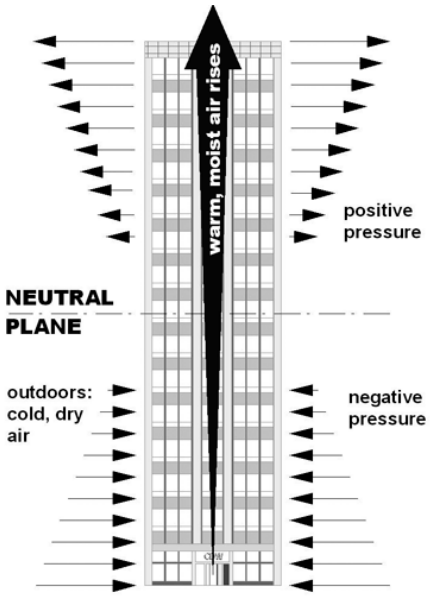

Figure 1 – Stack Effect Flows

Stack effect flows will be induced in any open shaft in a building, including mechanical, plumbing, and electrical shafts. Stack effect creates the most problems in elevator hoistways because these shafts cannot be closed at intervals as can plumbing and electrical shafts, and the landing doors at every floor at which the elevator stops are leaky because they open laterally, making them difficult to seal. Problems associated with stack effect range from annoying (strong flows blowing from openings) to safety

hazards when stack effect moves smoke and gasses from fires or accidental chemical releases vertically within the building.

The pressure induced at each floor is a function of the leakage areas, the height of the shaft and the temperature difference. Stack effect pressures across elevator landing doors can range up to 3 in. water (800pa) in an 800 ft building, as shown in Figure 2. [Tamura, G., 1968] Worst case pressures are observed in winter conditions since the indoor to outdoor temperature differences are greatest.

Because elevator landing doors open laterally, excessive pressure across the door can cause the door to bind and not open or close properly. If a landing door doesn't open, people cannot get on/off and if it doesn't close fully, the elevator cannot leave the floor. It is reported that in some buildings that experience significant stack effect, elevator mechanics must come to the building to adjust landing doors at least twice a year.

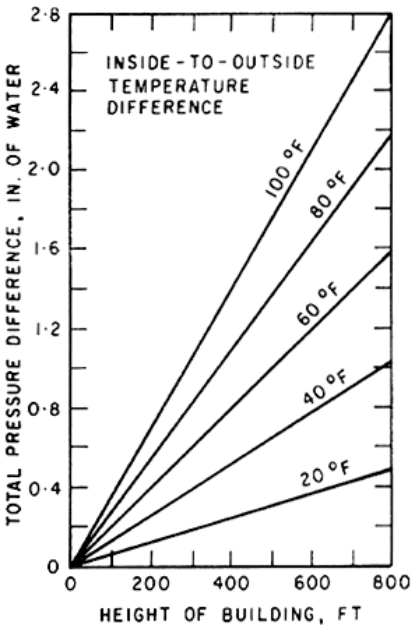

Figure 2 – Pressures Produced by Stack Effect Across Landing Doors

In fires, the fire itself can result in shaft flows driven by large temperature differences between fire gasses and ambient air. A paper by Bukowski [Bukowski 2005] based on an analysis by Klote showed that, in a fully sprinklered building (with operational sprinklers), fire temperatures are held low enough that significant shaft flows are never observed and the generation of smoke/toxic gasses that might present a hazard to occupants is limited because of the greatly reduced burning rates. Since stack effect is present whether there is a fire or not, shaft flows during fires still occur, but there is much less smoke/toxic gases if there are operating sprinklers.

Enclosed Elevator Lobbies

Enclosed elevator lobbies are intended to address one or more of the following issues:

1. **Protecting hoistways as vertical openings that could spread smoke/toxic gasses**

For this to be an issue, one needs to have (smoke) present in sufficient quantities to be hazardous, and pressure differences to drive it to and up or down the hoistway. Smoke is only present in a fire. Pressure differences that drive flows can come from fire temperatures, stack effect, mechanical systems, or elevator piston effect. Sprinklers maintain fire temperatures at only slightly elevated levels, so there is no significant driving force. Sprinklered fires produce small quantities of smoke/toxic gasses. [Klote 2004; Klote 1992]

Stack effect derives from building (shaft) height, leakage areas between the shaft and the inside/outside, and indoor/outdoor temperature differences. Elevator piston effect is not significant in other than single-car hoistways [Klote and Tamura 1986, Klote 1988].

Absent a fire, stack effect flows can be a nuisance but are rarely a health or safety hazard. In a fire, it is possible for stack effect forces to carry smoke up or down shafts where elevator hoistways would see the largest flows because landing doors have the largest leakage areas. However, the quantity of smoke and gas produced in a sprinkler-controlled fire is small and when distributed into the building volume the concentration, and thus the potential effect on occupants, is small. Further, in a sprinkler-controlled fire temperatures are held only slightly above ambient, so the only force available to move smoke and gas up shafts is stack effect, and stack effect flows are low.

Using the accepted equation from the 2009 ASHRAE Fundamentals Handbook, estimates of volumetric flows due to stack effect in a 500 ft (152 m) tall hoistway range from just over 1000 CFM to just over 4000 CFM over a range of outdoor temperatures between -40 and 40 F (-40 to 4.4 C). Nuisance problems associated with stack effect are being addressed by designers of very tall buildings by breaking the shafts about every 40 stories, but this is not possible on elevators (especially shuttle and service cars) that need to serve every floor. A secondary effect of addressing the nuisance problems is that many shafts are no longer tall enough to yield significant stack effect.

From this it can be concluded that elevator lobbies are not generally necessary to prevent smoke migration via hoistways in fires for sprinklered buildings except possibly in very tall buildings with large occupant loads that would require significant time to evacuate from height.

2. Protecting occupants during a fire (safe place)

Since elevators are not to be used in fires except those designated explicitly for Fire Service [IBC Section 3007] and Occupant Egress [IBC Section 3008] and both these sections require lobbies, then lobbies for general use elevators should not be needed to protect occupants during a fire. Exit stairwells are provided explicitly to provide a protected means of egress in fires. One conclusion of the refuge area study for GSA [Klote 1992] was that, in a fully sprinklered building, the entire building is an area of refuge. With respect to protecting occupants in elevators, ASME A17.1 Firefighter Emergency Operation (FEO) will take the elevators out of service and return them to the level of exit discharge before smoke can enter the hoistway, regardless of whether an enclosed lobby is provided. In 3007- and 3008-type elevators, the required lobbies are provided to delay recall as long as possible to permit safe use, along with providing a protected space for occupants to wait or for fire fighters to stage below the fire and to operate a forward command post.

Hoistway pressurization instead of Lobbies

Elevator lobbies are permitted to be eliminated where additional doors [IBC Section 3002.6] or pressurized hoistways [IBC Section 708.14.2] are provided. Pressures are required by the IBC to be between 0.10 and 0.25 in. of water, with the lower limit representing the minimum necessary to prevent flow into the hoistway and the upper

limit representing the value above which the landing doors might jam. In the course of this study, the Group discovered that common practice for mechanical designers is to utilize unconditioned outside air to pressurize the hoistway and to pressurize stairways.

Filling shafts with air near the outside temperature reduces stack effect since these flows are driven by differences in temperature between the shaft air and outside air. According to one mechanical engineer, even where only the stairways are pressurized with unconditioned air, the temperature in the hoistways will be driven toward the outside temperature because air moving into the stair will leak into the building and flow into other shafts, including hoistways

However, the question has been raised as to the effect of outside air of extreme temperatures (extreme hot or extreme cold) on the safe operation of the elevators, particularly "machine-room-less" elevators, where elevator machinery is located within the hoistway. Typically, elevator manufacturers publish temperature limits in their operating instructions, and 95 F (35 C) non-condensing is a common limit. More study may be required to determine how long the equipment can be exposed to extreme temperatures before performance is degraded below safe levels. Note that the IBC smoke control provisions state that such systems must perform for 20 minutes or 1.5 times the evacuation time, whichever is less. While 1.5 times the evacuation time is reasonable, the 20 minute maximum may not be appropriate for very tall buildings as the time to egress even with elevators may be much longer (depending on the number of floors evacuating or relocating). Occupant self-evacuation elevator systems utilizing all public-use cars (as required in IBC Section 3008) are capable of evacuating 100% of the occupants of any building in 1 hour or less [Bukowski 2008]. Also, the 20 minute maximum would certainly not be appropriate for Fire Service Access Elevators which are intended to be operational for the duration of a fire not just during building evacuation. Standby power is required to be available for both types of elevators for two hours which may indicate the intended duration of operation.

Smoke Control Systems Design

In any building, there exist complex flow paths that include construction cracks and hidden spaces not normally apparent. The larger the building, the more complex these flow paths can become. In addition, there can be strong interaction between stair and hoistway pressurization systems in buildings that have both [Miller 2008].

Section 909.4 of the IBC requires a *rational analysis* to be performed and submitted with the construction documents, accounting for a number of factors including stack effect, fire temperatures, wind, HVAC, climate and duration of operation. The scope of the required analysis for many buildings results in a complexity that can only adequately be addressed through the utilization of computer (network) models such as CONTAM, developed and distributed by NIST [NIST 2011].

Due to the existence of multiple, complex flow paths, all of which interact in complex ways, and especially where some are mechanically pressurized, it is crucial that the required rational analysis utilize network models for high-rise buildings that have one or more of the following characteristics:

- Buildings in which there is more than a 40% difference in floor area between any two floors,
- Buildings that contain a parking garage, whether open or enclosed,
- Buildings that contain both pressurized stairways and pressurized hoistways,
- Buildings that contain stacked atria,
- Buildings containing atria with mechanical smoke control, and
- Buildings containing shafts taller than 420 feet

Stairway Pressurization

Stairway pressurization generally is outside the scope of this Study Group but there are many elements of stairway pressurization systems that impact how the elevator hoistways will perform during a fire. One of the most important issues is how stair pressurization affects the performance of the hoistway when the option of pressurizing the hoistway is chosen.

Effectiveness of Fire Safety Systems

This section serves the purpose of bringing the technical analysis together with a more thorough review of how the features of the building whether passive or active, work together to manage the fire and protect building occupants. This is demonstrated through the use of the Fire Safety Concepts Tree (NFPA 550).

Code intent and strategy

The intent of Section 713.14.1 for requiring an elevator lobby enclosure is to protect the elevator shaft from smoke infiltration and possible smoke spread onto other (non-fire) floors. ICC's International Building Code 2012 edition requires various fire safety systems and features based upon a building's use and occupancy, height and area, and construction type. These features are part of an overall strategy to protect the building occupants and emergency responders from fire. Primary fire safety systems and features are:

- Automatic fire sprinkler system
- Automatic and manual fire detection and alarm system
- Maximum travel distance to an exit
- Egress / exit shaft enclosure
- HVAC system controls
- Elevator lobby shaft enclosure
- Elevator shaft venting

Fire Safety Concepts Tree Analysis

The effectiveness and interaction of these systems and features to achieve fire safety is easiest described by NFPA 550 *Guide to the Fire Safety Concepts Tree* (the "Tree") 2007 edition (Appendix A). Rather than considering each fire safety system and features separately, the *Tree* provides a "systems approach" to fire safety, examines all fire safety systems holistically to determine how they influence the achievement of fire safety goals and objectives. The *Tree* uses logic gates to show a hierarchical relationship of fire safety concepts. There are two types of logic gates in the *Tree*: "or" gates and "and" gates. An "or" gate, represented by a circle with a plus sign in it, indicates that any of the concepts below it will cause or have as an outcome based on the concept above it. An "and" gate is represented by a circle with a dot in the middle. This indicates that all of the concepts below the "and" gate are needed to achieve the concept above the gate. The *Tree* can also identify gaps and areas of redundancy in fire protection strategies.

Again, Section 713.14.1 is intended to limit smoke exposure to occupants on non-fire floors, Figure 1 illustrates the top tier gates of the *Tree* to accomplish the objective. The building code assumes the fire occurs, thus, the objective is to "manage fire impact" by "manage the fire" or "manage exposed."

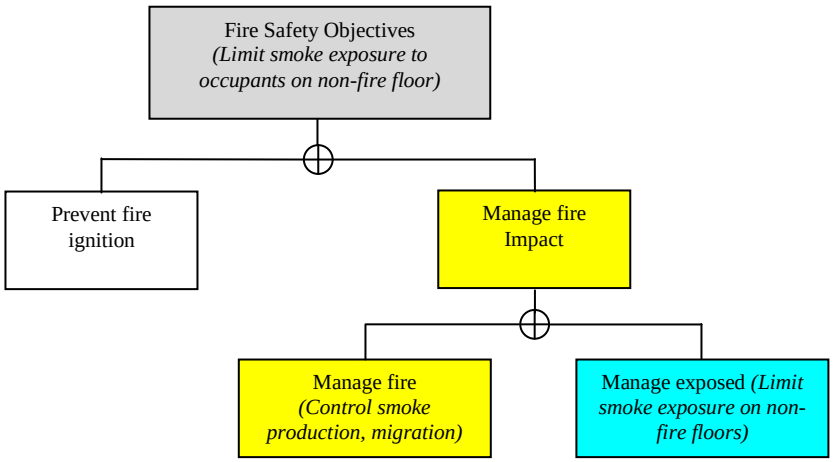

Figure 1: Top-gates of the Tree annotated with the intent of IBC Section 713.14.1

Figure 2 illustrates the two or three possible options to achieve "manage fire." Suppressing the fire by an automatic fire suppression system installed in accordance with IBC Chapter 9 **or** controlling fire (vertical migration) by construction features in accordance with IBC Sections 713 (shafts), 711 (horizontal assemblies), 716 (opening protectives) ***or*** venting fire/smoke that infiltrates into the elevator shaft in accordance with Section 3004 are each ways to limit the smoke exposure to occupants on non-fire floors. Controlling the combustion process, while identified as an option that can be

used in general and used to a limited extent by the IBC's requirements for interior finish, is not practical or sufficient to solely achieve the objective in a commercial building.

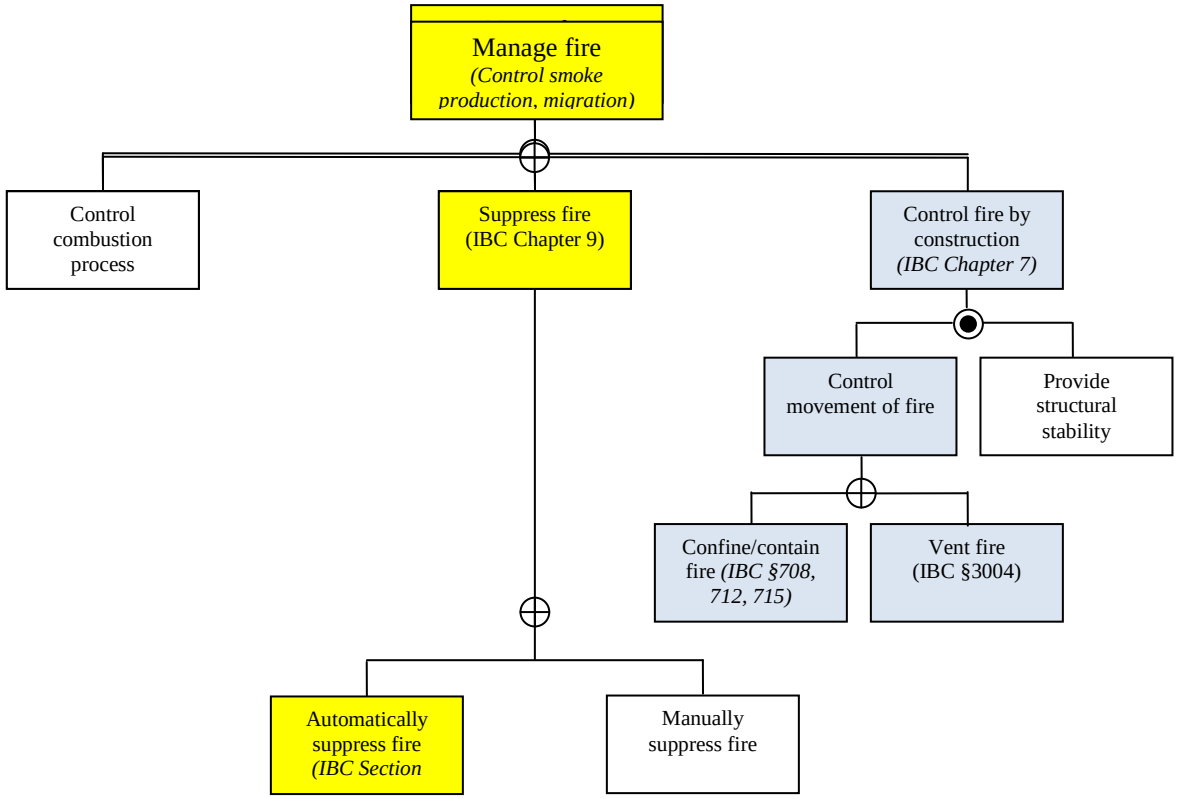

Figure 2: IBC 2012 required features and systems that contribute to limiting smoke production and migration to non-fire floors.

Figure 3 illustrates the options to achieve "manage exposed." "Safeguard exposed" is accomplished by "defend-in-place" and "move exposed." IBC Chapter 9 and Section 403.3 and 403.4 require various fire safety systems to detect and alert the building occupants of a fire condition to initiate evacuation. The provisions of IBC Chapter 10 and Section 403.5 both require various fire safety features and systems to protect the building occupants during egress or evacuation, thus limiting smoke exposure to occupants on non-fire floors. Section 403.2.3 requires egress stair and elevator hoistway enclosures in Risk Categories III and IV high rise buildings (Table 1604.5), and all buildings over 420 ft in height to exhibit impact resistance that resists the passage of fire and smoke into the shafts, minimizing the potential for inadvertent compromise of the enclosure .

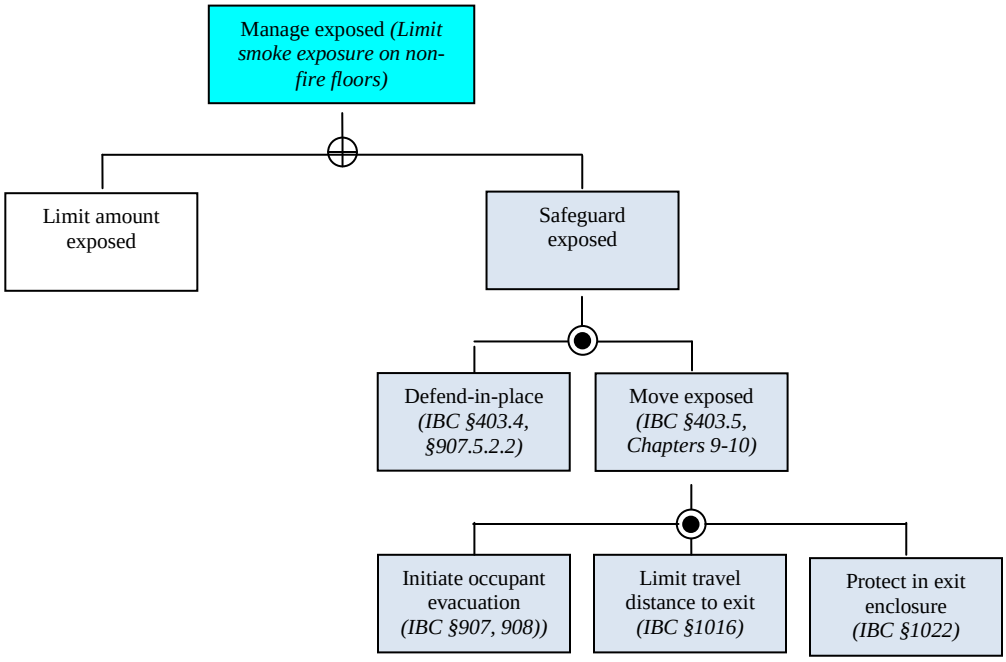

Figure 3: IBC 2012 required features and systems that limit smoke exposure to occupants on non-fire floors.

Fire Suppression Systems Availability

To address the automatic fire suppression (automatic sprinkler) system reliability, it is possible to use the Tree to show the primary system components, features and safeguards required by the IBC to ensure availability of suppression operation. The Tree can identify "single point failure" elements that could result in an unacceptable outcome in the event of a fire. This approach can be used in lieu of a quantitative risk analysis which requires system performance data, event tree and fault tree analysis, as well as occupant exposure analysis (an Available Safe Egress Time vs. Required Safe Egress Time comparative analysis). This could be a line diagram of an IBC-required sprinkler system in a high-rise building including the system components analysis as follows:

- A single sprinkler fails to open:
    - NFPA 13 requires multiple sprinklers be included in the hydraulically most remote area to flow in the fire sprinkler design calculation, resulting in fire control vs. fire extinguishment which significantly reduces smoke production versus no sprinkler activation condition.
- Sprinkler system floor control valve is closed/no water available:

  - This is historically the single-highest cause for sprinkler system failure. IBC Section 903.4 requires electronic supervision of water supply, monitored both on-site and off-site for increased reliability/availability.
  - Section 403.3.1 requires buildings over 420 feet to have two risers located in remote exit enclosures with each riser feeding the sprinklers on alternate floors, providing redundant supplies.
  - The sprinkler systems must be arranged such that a single point of failure of the supply could at most result in failure of the sprinklers on one floor with those on the floors above and below still functional.
- Sprinkler/standpipe riser is out-of-service:
  - IBC Section 905.2 requires all sprinkler/standpipe risers be interconnected at the base, providing redundancy and greatly eliminating the potential of a loss of sprinkler/standpipe riser.
- Automatic fire pump fails to operate:
  - Pump failure: jockey pump operates, sufficient water supply for one- to two-sprinklers and building fire alarm notification. For buildings less than 420 ft. in height above fire department connection, fire department pumper is capable of supporting fire flow demand for sprinkler and standpipe systems.
  - Pump failure due to no utility power supply: IBC Section 403.4.8 requires emergency power system for redundancy.
- No water in city/municipal water main or valve closed at connection to city/municipal water supply
  - IBC Section 403.3.2 requires a connection to a minimum of two city water mains, minimizing the potential for loss of municipal water supply.

Reliability of Other Systems

Fire sprinkler systems are not the only fire protection features within a building. Most buildings have combinations of other types of fire protection features that include fire and/or smoke related walls, floor/ceiling assemblies, egress systems, detection systems, alarm systems, smoke control systems, and other mechanisms for protecting people from fire and the products of combustion. The discussion above regarding sprinkler system reliability is just an example of how a risk analysis might be approached. Similar types of analyses with potential failure modes for each of these other systems in a building would need to be performed for the other fire protection features in order for a risk analysis to be complete. Such a risk analysis could be performed using the same methodology as that used for the sprinkler system reliability discussion.

Recommendations for IBC Regarding Elevator Lobbies

Based on the forgoing, the following recommendations are suggested for consideration by the CTC:

1. Unsprinklered low- and mid-rise buildings (buildings with an occupied floor less than 55 feet above the lowest level fire department vehicle access or less than 75 feet above the lowest level of fire department access with an occupant load less than 30 on each floor)
    - No enclosed elevator lobbies required for traditional elevators.
    - *Rationale: While fire temperatures can be high, driving smoke and gasses around the building, occupants traveling at the typical rate of about 150 ft/min over the maximum permitted travel distance of 200 ft can reach the safety of an egress stairway in about 1.3 minutes and can descend to the level of exit discharge in less than five minutes. This is merely an approximation but provides an indication of the amount of time necessary for egress in low and mid rise buildings. Also, some code officials participating in the study group stated that lobbies have traditionally not been required in these type buildings in their jurisdictions and their experience has been good.*
    - Sprinklers are required in any building containing Fire service access (IBC Section 3007) and occupant evacuation (IBC Section 3008) elevators so these would not be found in buildings in this category.
2. Sprinklered buildings with occupied floors less than 75 feet to the lowest level of fire department vehicle access :
    - No enclosed elevator lobbies required for traditional elevators
        - *Rationale: In sprinklered buildings fire temperatures are kept low and such buildings have little stack effect. Traditional elevators are not to be used by occupants in fires, so any small infiltration into the hoistway is not significant. Shafts shorter than 75 feet have limited stack effect flows.*
    - Enclosed lobbies required for fire service access (IBC Section 3007) and occupant evacuation (IBC Section 3008) elevators
        - *Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.*
3. Sprinklered buildings with an occupied floor more than 75 feet to the lowest level of fire department vehicle access but less than 420 feet in building height
    - No enclosed elevator lobbies required for traditional elevators.
        - *Rationale: In sprinklered buildings fire temperatures are kept low and such buildings have little stack effect. Traditional elevators are not to be used by occupants in fires, so any small infiltration into the hoistway is not significant.*
    - Enclosed elevator lobbies required for fire service access (IBC Section 3007) and occupant evacuation (IBC Section 3008) elevators
        - *Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a*

physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.

4. Sprinklered buildings more than 420 feet in building height
    - Enclosed elevator lobbies or pressurization of the hoistways required for traditional elevators.
        - *Rationale: While traditional elevators are not permitted to be used in fires, the shaft height might result in more inadvertent smoke infiltration due to stack effect and spread to remote areas. Enclosed lobbies with smoke tight construction or pressurization of the hoistways will limit infiltration. Further consideration and discussion is needed regarding the threshold of 420 feet.*
    - Enclosed elevator lobbies required for fire service access (IBC Section 3007) and occupant evacuation (IBC Section 3008) elevators
        - *Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.*
    - EXCEPTION: Hoistways for traditional elevators separated into vertical sections not exceeding 420 feet in height with no communication of the shaft environment between sections shall not require enclosed lobbies or pressurization as long as the following condition is met.
        - Where connection of elevator banks is by a transfer corridor, it shall be necessary to pass through at least 2 swinging doors or a revolving door that maintains a separation of the environments to pass from one section to another.
        - *Rationale: By breaking shafts into shorter sections and limiting communication of different shaft environments, both stack effect and smoke migration will be limited to the extent that pressurization of the hoistways is not required.*
5. The design of pressurization systems for elevator hoistways shall be based on a *rational analysis* in accordance with Section 909.4 that utilizes a network model approved by the AHJ and which includes an analysis of possible interactions between building shafts pressurized by different systems, and between pressurized and unpressurized shafts that exceed 420 feet in height. Add guidance to commentary for 909.4 that the rational analysis should show that the pressurization design will maintain the estimated Fractional Effective Dose (FED) below 0.5 and the estimated visibility distance above 25 feet within the stairway for 1.5 times the estimated evacuation time for each of the design fires selected.
        - *Rationale: Taller buildings with more complex flow paths require analysis utilizing a network model that can account for these interacting flow paths. The criteria suggested for commentary represents the standard of practice for a fire hazard analysis preformed as the required rational analysis.*

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TG2 PROPOSALS

PROPOSAL 1
IMPLEMENTATION OF RECOMMENDATIONS

713.14.1 General. Enclosed elevator lobbies in accordance with Section 713.14.2 shall be required in buildings more than 420 feet in height.

Exception: Enclosed elevator lobbies are not required where all the following are met:

1. Elevator group hoistways do not exceed 420 feet in height from the bottom of the elevator pit to the top of the hoistway.
2. There is no communication of the shaft environment between elevator groups.
3. On other than the level of exit discharge, where two or more elevator groups open on to a common floor, they shall be separated by at least 2 sets of doors or a revolving door that maintains a separation of the environments.

713.14.2~~1~~ Elevator lobby requirements. Where an enclosed elevator lobby is required they shall be provided at each ~~floor~~ hoistway entrance ~~where an elevator shaft enclosure connects more than three *stories*~~. The lobby enclosure shall separate the elevator shaft enclosure doors from each floor by *fire partitions*. In addition to the requirements in Section 708 for *fire partitions*, doors protecting openings in the elevator lobby enclosure walls shall also comply with Section 716.5.3 as required for *corridor* walls and penetrations of the elevator lobby enclosure by air ducts and transfer openings hall be protected as required for *corridors* in accordance with Section 717.5.4.1. Elevator lobbies shall have at least one *means of egress* complying with Chapter 10 and other provisions within this code.

Exceptions:

1. Enclosed elevator lobbies are not required at the level(s) of *exit discharge*, provided the level(s) of *exit discharge* 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 712 are not required to have enclosed elevator lobbies.

3. Enclosed elevator lobbies are not required where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal.

~~4. 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. This exception shall not apply to the following:~~

~~4.1 Group I-2 occupancies;~~

~~4.2 Group I-3 occupancies, and~~

~~\4.3 Elevators serving floor levels over 75 feet (22 860 mm) above the lowest level of fire department vehicle access in high-rise buildings.~~

~~5~~4. 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. In addition to the requirements in Section 710 for smoke partitions, doors protecting openings in the smoke partitions shall also comply with Sections 710.5.2.2, 710.5.2.3, and 716.5.9 and duct penetrations of the smoke partitions shall be protected as required for *corridors* in accordance with Section 717.5.4.1.

5. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 909.21.

6. Enclosed elevator lobbies are not required where the elevator serves only *open parking garages* in accordance with Section 406.5.

713.14.1.1 Area of refuge. Areas of refuge shall be provided as required by Section 1007.

Reason: This proposal is a technical shift away from what has been termed by the CTC study group "traditional elevator lobbies" as opposed to Fire Service Access Elevators and Occupant evacuation elevators. This shift is based upon background data and a technical analysis produced by the Study Group on Elevator lobbies for the CTC. More specifically this study can be reviewed at the following link.

This study reveals based upon sprinkler performance and stack effect that the hazards of floor to floor movement of smoke are minimal until the shafts (hoistways) start becoming very tall. The study looks at sprinkler reliability to better establish that the sprinklers will operate as intended. The recommendations of the study group were used to draft the proposal. The recommendations are as follows:

1. Unsprinklered low- and mid-rise buildings (buildings with an occupied floor less than 55 feet above the lowest level fire department vehicle access or less than 75 feet above the lowest level of fire department access with an occupant load less than 30 on each floor)
    - No enclosed elevator lobbies required for traditional elevators.

- *Rationale: While fire temperatures can be high, driving smoke and gasses around the building, occupants traveling at the typical rate of about 150 ft/min over the maximum permitted travel distance of 200 ft can reach the safety of an egress stairway in about 1.3 minutes and can descend to the level of exit discharge in less than five minutes. This is merely an approximation but provides an indication of the amount of time necessary for egress in low and mid rise buildings.*
- Sprinklers are required in any building containing Fire service access (3007) and occupant evacuation (3008) elevators so these would not be found in buildings in this category.

2. Sprinklered buildings with occupied floors less than 75 feet to the lowest level of fire department vehicle access :
    - No enclosed elevator lobbies required for traditional elevators
        - *Rationale: In sprinklered buildings fire temperatures are kept low and such buildings have little stack effect. Traditional elevators are not to be used by occupants in fires, so any small infiltration into the hoistway is not significant. Shafts shorter than 75 feet have limited stack effect flows.*
    - Enclosed lobbies required for fire service access (3007) and occupant evacuation (3008) elevators
        - *Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.*
3. Sprinklered buildings with an occupied floor more than 75 feet to the lowest level of fire department vehicle access but less than 420 feet in building height
    a. No enclosed elevator lobbies required for traditional elevators.
        i. *Rationale: In sprinklered buildings fire temperatures are kept low and such buildings have little stack effect. Traditional elevators are not to be used by occupants in fires, so any small infiltration into the hoistway is not significant.*
    b. Enclosed elevator lobbies required for fire service access (3007) and occupant evacuation (3008) elevators
        i. Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.
4. Sprinklered buildings more than 420 feet in building height
    a. Enclosed elevator lobbies or pressurization of the hoistways required for traditional elevators.
        i. Rationale: While traditional elevators are not permitted to be used in fires, the shaft height might result in more inadvertent smoke infiltration due to stack effect and spread to remote areas.

Enclosed lobbies with smoke tight construction or pressurization of the hoistways will limit infiltration. The threshold of 420 feet has been heavily debated and is a difficult issue. The reason this study group chose this number relates indirectly to this issue but indicates a higher level of risk to occupants. More specifically this is the height where it becomes difficult to pump water from the ground (fire department) for standpipes and sprinklers. This therefore is where reliability of water supply becomes more of a concern which can possibly relate to sprinkler performance. Also since it is consistent with additional criteria in the code seemed a reasonable point to transition to more restrictive requirements to compensate for the possible increase in risk level to occupants (egress time) and the possibility for an increase in smoke production and stack effect due to height.

b. Enclosed elevator lobbies required for fire service access (3007) and occupant evacuation (3008) elevators
    i. *Rationale: Fire service access and occupant egress elevators need to continue in operation during a fire. Lobbies provide a protected space to stage and to await the elevator and further provide a physical barrier to smoke that might activate a lobby smoke detector and trigger Phase I recall.*
c. EXCEPTION: Hoistways for traditional elevators separated into vertical sections not exceeding 420 feet in height with no communication of the shaft environment between sections shall not require enclosed lobbies or pressurization as long as the following condition is met.
    i. Where connection of elevator banks is by a transfer corridor, it shall be necessary to pass through at least 2 swinging doors or a revolving door that maintains a separation of the environments to pass from one section to another.
    ii. *Rationale: By breaking shafts into shorter sections and limiting communication of different shaft environments, both stack effect and smoke migration will be limited to the extent that pressurization of the hoistways is not required.*

It is important to note that these recommendations address fire service access elevators as well as occupant evacuation elevators but such elevators are not applicable to Section 713.14. In fact the recommendation of the analysis for those types of elevators was to keep the lobbies as they provide a multitude of functions that differ from traditional elevator lobbies. Additionally it should be noted that although enclosed elevator lobbies have been eliminated in many buildings for “traditional” elevators any building containing occupied floors more than 120 feet from the lowest level of fire department access will be required to have fire service access elevators. Such elevators are required to have a lobby with several integral features. If the elevators of choice are passenger elevators in the building an elevator lobby would be required of more substantial construction as compared to what is required in Section 713.14.1. This same

logic would apply in buildings that allow the use of elevators for evacuation in accordance with Section 3008. In that case lobbies would be required for the entire building regardless of building height.

Notes:

- Are any other code changes dependent on others?
- Exception 2 713.4.1 – provide criteria for 'shaft environment'; physical barrier, smoke barrier; evact system
- 713.14.1.1 – delete because an area of refuge/lobby would not be required in a 420 ft. building.
- Elevator groups – is this a hoistway? Elevator group in A17 is elevators tied to the same controller. This is a defined term in the IBC.
- How height is measure should be consistent between the main body and exceptions: building, elevator shaft (including pit), occupied floors; clarify how it is to be measured; measure from top to bottom of hoistway
- Make Exception 1 the charging language and define where the measurement of shaft height is being made.
- The issue is the height of the shaft – not the building; that needs to be the start
- The items written as exception are really criteria
- Define accurately how to isolate the shafts. Responding to the same call button is not relevant.
- Exception 3 – clarify separation requirements; the intent is to separate lobbies for stack effect; make separate requirements for when there are separate hoistways with sky lobbies; specify limit (i.e., smoke barrier or better)
- 713.14.2. Exception 1-3, should all be in the elevator lobby requirement in 713.14.1.
- The justification seem to indicate that the 420 feet is the height of the building for water and not stack effect (take the water problems out of the justifications); clarify why this should be the same threshold for stack effect. Maybe state that the committee did not want to introduce another threshold. Maybe rely on the association with the occupant evacuation elevator.
- If you tie the requirement to the height of the building rather than the height of the shaft, then you have to allow for 'convenience' elevators that might only serve minimal number of floors. Or if there are staggered/separated shafts?
- Make sure the reason statement says the intent of the elevator lobby purpose. What does the lobby do to mitigate the risk. Is this a belt and suspenders for when egress or fire fighting issues come into play?
- Bring up history of super high rises as justification/science for determining the appropriate height for requiring lobbies. The current requirements for lobbies are not justified.
- If we are already getting lobbies with fire service elevators and occupant evacuation elevators, you probably don't need a general requirement for lobbies at all.

- Need to coordinate deletion of the I-2 exception with the ad hoc healthcare committee

PROPOSAL 2
RATIONAL ANALYSIS COMPLEX BUILDINGS

909.4 Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted *construction documents* and shall include, but not be limited to, the items indicated in Sections 909.4.1 through 909.4.6. [F]

909.4.1 Stack effect. The system shall be designed such that the maximum probable normal or reverse stack effect will not adversely interfere with the system's capabilities. In determining the maximum probable stack effect, altitude, elevation, weather history and interior temperatures shall be used. [F]

909.4.2 Temperature effect of fire. Buoyancy and expansion caused by the design fire in accordance with Section 909.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with the system's capabilities. [F]

909.4.3 Wind effect. The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of Chapter 16. [F]

909.4.4 HVAC systems. The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems status. The design shall consider the effects of the fire on the HVAC systems. [F]

909.4.5 Climate. The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage. [F]

909.4.6 Duration of operation. All portions of active or passive smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is less. [F]

909.4.7 Complex buildings. For complex buildings the rational analysis required by 909.4 shall utilize an approved computer model that is capable of taking into account the complexity of the building arrangement and the interactions of different pressurization systems.

909.4.7.1 Complex buildings shall be designated by the code official and include but are not limited to-buildings with any of the following characteristics:

1. Highrise buildings in which there is more than a 40% difference in floor area between any two floors,

2. Highrise buildings that contain a parking garage, whether open or enclosed,
3. Highrise buildings that contain both pressurized stairways and pressurized hoistways,
4. Highrise buildings that contain stacked atria.
5. Highrise buildings containing atria with mechanical smoke control

909.4.7.2 Duration of Operation In a complex building all portions of active or passive smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 60 minutes or 1.5 times the calculated egress time, whichever is less. [F]

Reason: Task Group 2 of the CTC Elevator Lobby group studied the need for elevator lobbies for traditional elevators (Section 713.14.1), FSAE (3007) and Occupant Evacuation elevators(3008). This group conducted a technical analysis that concluded with several recommendations for the need for such lobbies and in addition provided a recommendation on the need for more close analysis of buildings with more extreme complexity. The analysis can be found at the following link:

In fact in many cases a traditional elevator lobby was determined to be unnecessary but for unusual building configurations there was more of a concern for interaction of systems and the negative impact of stack effect. For instance, dramatic reductions in the footprint of a building can alter the flows within a building. Below is recommendation 5 from the technical analysis.

5. The design of pressurization systems for elevator hoistways shall be based on a *rational analysis* in accordance with Section 909.4 that utilizes a network model approved by the AHJ and which includes an analysis of possible interactions between building shafts pressurized by different systems, and between pressurized and unpressurized shafts that exceed 420 feet in height. Add guidance to commentary for 909.4 that the rational analysis should show that the pressurization design will maintain the estimated Fractional Effective Dose (FED) below 0.5 and the estimated visibility distance above 25 feet within the stairway for 1.5 times the estimated evacuation time for each of the design fires selected.

    iii. Rationale: Taller buildings with more complex flow paths require analysis utilizing a network model that can account for these interacting flow paths. The criteria suggested for commentary represents the standard of practice for a fire hazard analysis preformed as the required rational analysis.

Notes:

- *What is the justification for when a single floor is a different size (i.e, penthouse);*
- *What about terraced buildings where the 40% may be the top and bottom floors instead of adjacent floors.*
- *The thresholds don't seem to be addressing the identified problem.*

- *The items for a 'complex building' is confusing*
- *Are Smoke control systems what sends you to this section?*
- *Pressure differentials are a concern when dealing with pressurized stairways and other air control systems*
- *This proposal is about complex mechanical systems, not complex building configurations.*
- *The reason statement is missing the reference to the website for the analysis.*
- *What should the code official use as criteria to approve the computer model?*

TG3 PROPOSALS

PROPOSAL 1
EXIT ACCESS THROUGH ENCLOSED ELEVATOR LOBBIES

Revise as follows:

713.14.1 Elevator lobby. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three *stories*. The lobby enclosure shall separate the elevator shaft enclosure doors from each floor by *fire partitions*. In addition to the requirements in Section 708 for *fire partitions*, doors protecting openings in the elevator lobby enclosure walls shall also comply with Section 716.5.3 as required for *corridor* walls and penetrations of the elevator lobby enclosure by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1. Elevator lobbies shall have at least one *means of egress* complying with Chapter 10 and other provisions within this code. Egress through an elevator lobby shall be permitted in accordance with Section 1014.2 item 5

3007.7 Fire service access elevator lobby. The fire service access elevator shall open into a fire service access elevator lobby in accordance with Sections 3007.7.1 through 3007.7.5. Egress is permitted through the elevator lobby ~~in accordance with Section 1014.2 item 5~~.
Exception: Where a fire service access elevator has two entrances onto a floor, the second entrance shall be permitted to open into an elevator lobby in accordance with Section 708.14.1.

3008.7 Occupant evacuation elevator lobby. The occupant evacuation elevators shall open into an elevator lobby in accordance with Sections 3008.7.1 through 3008.7.7. Egress is permitted through the elevator lobby in accordance with Section 1014.2 item 5.

Add a new item 5 to section 1014.2
5. Exit access through an enclosed elevator lobby~~, not required by Section 3007,~~ is permitted. Access to at least one of the required exits shall be accomplished without travel through the enclosed elevator lobbies required by Section 713.14.1 and Section 3008.

~~Access through fire service access elevator lobbies is not restricted.~~

Where the path of exit access travel passes through an enclosed elevator lobby the level of protection required for the enclosed elevator lobby is not required to be extended to the exit unless direct access to an exit is required by other sections of this code.

1018.6 Corridor continuity. Fire-resistance-rated *corridors* shall be continuous from the point of entry to an *exit*, and shall not be interrupted by intervening rooms. Where the path of egress travel within a fire-resistance-rated *corridor* to the *exit* includes travel along unenclosed *exit access stairways* or *ramps*, the *fire resistance-rating* shall be continuous for the length of the *stairway* or *ramp* and for the length of the connecting *corridor* on the adjacent floor leading to the *exit*.

Exceptions:

1. Foyers, lobbies or reception rooms constructed as required for *corridors* shall not be construed as
Intervening rooms.

2. Enclosed elevator lobbies as permitted by Section 1014.2 item 5 shall not be construed as intervening rooms.

Reason: First the purpose of elevator lobbies is first discussed. The code itself does not state what the purpose of a traditional elevator lobby is but historically and to a certain extent from the code commentary there are several purposes that could be concluded.

- Prevent smoke from spreading from the floor of fire origin through the elevator hoistway.
- Protect occupied areas from smoke spread from the elevator hoistway

In the case of FSAEs and Occupant Evacuation elevators there are additional purposes such as providing a staging area for fire fighters, a protected area for occupants awaiting egress and also to delay the automatic activation of phase 1 recall. Note that Both FSAE and Occupant evacuation elevators require direct access to an exit within the lobby.

Based upon the intent of the code it was felt that exit access through elevator lobbies should be limited only for occupant evacuation elevators and traditional elevators. Occupant evacuation elevators are specifically drawing occupants to the lobby. It would not be appropriate to allow a tenant space with all egress paths having to go through the enclosed lobby to get to a stair since they will be working against the traffic flow of egress. Traditional enclosed elevator lobbies if required are required with a concern for smoke migration in the elevator hoistway. Therefore it would not be prudent to allow both paths of egress to pass through the enclosed lobby.

The last sentence of the proposed item 5 also clarifies that if an egress path passes through a lobby with more restrictive construction that the level of construction does not need to be continued to the exit.

The new exception to Section 1018.1 clarifies also that travel is permitted through an enclosed elevator lobby if the enclosed elevator lobby is located in a rated corridor.

Notes: Why different text/requirement in 3007.7 vs 3008.7?

PROPOSAL 2
DIRECT ACCESS

Revise as follows:

3007.7.1 Interior exit stairway access. The fire service access elevator lobby shall have direct access from the enclosed elevator lobby to an enclosure for an interior exit stairway.

Exception: Access to an interior exit stairway shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance Section 716.5.3.

3008.7.1 Interior exit stairway access. The occupant evacuation elevator lobby shall have direct access from the enclosed elevator lobby to an interior exit stairway or ramp.

Exception: Access to an interior exit stairway shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance Section 716.5.3.

505.2.3 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) in height, 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 is not greater than 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 directly to an *exit* from the *mezzanine* level.
3. …

1027.1 General. *Exits* shall discharge directly to the exterior of the building. The *exit discharge* shall be at grade or shall provide ~~direct~~ access directly to grade. The *exit discharge* shall not reenter a building. The combined use of Exceptions 1 and 2 shall not exceed 50 percent of the number and capacity of the required exits.

Direct Access. A path of travel from a space to an immediately adjacent space through an opening in the common wall between the two spaces.

Reason: Both FSAE and Occupant Evacuation elevators lobbies call for direct access to the stairway. The term direct access is not necessarily clear in its meaning and could if

applied as intended place severe design limitations on some buildings. The intent of this proposal is to set out a viable option for the stairs to be more remotely located from the lobby. A package of requirements that provides fire resistance rated construction and smoke and draft protection is provided. A definition is also provided for to clarify the use of the term. In some cases text had to be revised in unrelated Sections to be consistent with the application of this term. See revisions to Sections 505.2.3 and 1027.1.

Background sections for the separation requirements are as follows:

708.1 General. The following wall assemblies shall comply with this section.

1. Walls separating *dwelling units* in the same building as required by Section 420.2.
2. Walls separating *sleeping units* in the same building as required by Section 420.2.
3. Walls separating tenant spaces in *covered and open mall buildings* as required by Section 402.4.2.1.
4. Corridor walls as required by Section 1018.1.
5. Elevator lobby separation as required by Section 713.14.1.

708.2 Materials. The walls shall be of materials permitted by the building type of construction.

708.3 Fire-resistance rating. Fire partitions shall have a *fire resistance rating* of not less than 1 hour.

Exceptions:

1. Corridor walls permitted to have a 1/2 hour *fire-resistance rating* by Table 1018.1.
2. *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.

716.5.3 Door assemblies in corridors and smoke barriers. *Fire door* assemblies required to have a minimum *fire protection rating* of 20 minutes where located in *corridor* walls or *smoke barrier* walls having a *fire-resistance rating* in accordance with Table 716.5 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test.

Exceptions:

1. Viewports that require a hole not larger than inch (25 mm) in diameter through the door, have at least a 0.25-inch-thick (6.4 mm) glass disc and the holder is of metal that will not melt out where subject to temperatures of 1,700°F (927°C).
2. *Corridor* door assemblies in occupancies of Group I-2 shall be in accordance with Section 407.3.1.
3. Unprotected openings shall be permitted for *corridors* in multitheater complexes where each motion picture auditorium has at least one-half of its required *exit* or *exit access doorways* opening directly to the exterior or into an *exit* passageway.
4. Horizontal sliding doors in *smoke barriers* that comply with Sections 408.3 and 408.8.4 in occupancies in Group I-3.

716.5.3.1 Smoke and draft control. *Fire door* assemblies shall also meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot (0.01524 m3/s □□ m2) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited. Installation of smoke doors shall be in accordance with NFPA 105.

716.5.3.2 Glazing in door assemblies. In a 20-minute *fire door assembly*, the glazing material in the door itself shall have a minimum fire-protection-rated glazing of 20 minutes and shall be exempt from the hose stream test. Glazing material in any other part of the door assembly, including transom lights and sidelights, shall be tested in accordance with NFPA 257 or UL 9, including the hose stream test, in accordance with Section 716.6.

Background information on the term "direct access" is as follows:

ANCHOR BUILDING. An exterior perimeter building of a group other than H having direct access to a *covered or open mall building* but having required *means of egress* independent of the mall.

405.4.3 Elevators. Where elevators are provided, each compartment shall have direct access to an elevator. Where an elevator serves more than one compartment, an elevator lobby shall be provided and shall be separated from each compartment by a s*moke barrier* in accordance with Section 709. Doors shall be gasketed, have a drop sill and be automatic-closing by smoke detection in accordance with Section 716.5.9.3.

407.4.1 Direct access to a corridor. Habitable rooms in Group I-2 occupancies shall have an *exit access* door leading directly to a *corridor*.

505.2.3 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) in height, 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 is not greater than 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. …

1007.6 Areas of refuge. Every required *area of refuge* shall be *accessible* from the space it serves by an *accessible means of egress*. The maximum travel distance from any *accessible* space to an *area of refuge* shall not exceed the travel distance permitted for the occupancy in accordance with Section 1016.1. Every required *area of refuge* shall have direct access to a *stairway* complying with Sections 1007.3 or an elevator complying with Section 1007.4. Where an elevator lobby is used as an *area of refuge*, the shaft and lobby shall comply with Section 1022.10 for smokeproof enclosures except where the elevators are in an *area of refuge* formed by a *horizontal exit* or smoke barrier.

1007.7.2 Outdoor facilities. Where *exit access* from the area serving outdoor facilities is essentially open to the outside, an exterior area of assisted rescue is permitted as an alternative to an *area of refuge*. Every required exterior area of assisted recue shall have direct access to an *interior exit stairway*, exterior *stairway*, or elevator serving as an *accessible means of egress* component. The exterior area of assisted rescue shall comply with Sections 1007.7.3 through 1007.7.6 and shall be provided with a two-way communication system complying with Sections 1007.8.1 and 1007.8.2.

1027.1 General. *Exits* shall discharge directly to the exterior of the building. The *exit discharge* shall be at grade or shall provide direct access to grade. The *exit discharge* shall not reenter a building. The combined use of Exceptions 1 and 2 shall not exceed 50 percent of the number and capacity of the required exits.

1105.1.1 Parking garage entrances. Where provided, direct access for pedestrians from parking structures to buildings or facility entrances shall be *accessible*.

1105.1.2 Entrances from tunnels or elevated walkways. Where direct access is provided for pedestrians from a pedestrian tunnel or elevated walkway to a building or facility, at least one entrance to the building or facility from each tunnel or walkway shall be *accessible*.

TABLE 2902.1

c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted where such room is provided with direct access from each patient sleeping unit and with provisions for privacy.

3007.7.1 Access. The fire service access elevator lobby shall have direct access to an enclosure for an *interior exit stairway*.

3008.7.1 Access. The occupant evacuation elevator lobby shall have direct access to an *interior exit stairway* or *ramp*.

3109.4.1.8 Dwelling wall as a barrier. Where a wall of a *dwelling* serves as part of the barrier, one of the following shall apply:

1. Doors with direct access to the pool through that wall shall be equipped with an alarm that produces an audible warning when the door and/or its screen, if present, are opened. The alarm shall be *listed* and labeled in accordance with UL 2017. In dwellings not required to be *Accessible units*, *Type A units* or *Type B units*, the deactivation switch shall be located 54 inches (1372 mm) or more above the threshold of the door. In dwellings required to be *Accessible units*, *Type A units* or *Type B units*, the deactivation switch shall be located not higher than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the threshold of the door.

Notes:
New definition for 'direct access' needs to be underlined. Direct access is needed to solve the lobby issue which then warrants a terminology change for non lobby applications
1105.1.1 – make revision to the term in this section

PROPOSAL 3
CONFLICTING DOORS AND SIGNAGE

Add new text as follows:

1022.10 Elevator Lobby identification signs. Doors leading to elevator lobbies from the interior exit stairway shall be identified by signage located on the door or directly adjacent to the door stating "Elevator Lobby." Signage shall be in accordance with Section 1022.9.1 items 4, 5 and 6.

Exception. Where there is only one door from the interior exit stairway signage is not required.

Reason: This issue is more specific to FSAE and the many doors required. The code currently requires direct access from the lobby to a stairway and additionally the same stairway must have a door that opens directly to the floor based upon standpipe access issues (i.e. limiting the number of doors that need to be open to lay hose during a fire). Depending upon how the stairway is laid out issues with conflicting doors may arise. Also there is concern that this particular requirement may cause confusion for occupants and Fire fighters in terms of way finding. The conflicting door issue is felt to be addressed by the design process but signage is still felt necessary to direct occupants and fire fighters as to which door leads to the elevator lobby. The elevator lobby could be for fire service access elevators (FSAE) or occupant evacuation elevators. Due to the more general application of these requirements and the focus on the requirements being related to interior exit stairways the requirements are proposed in Section 1022 to help keep signage requirements together.

Notes: Include graphics for different scenario.
Exception confusing – only need a sign on the door when theres 2 doors out of thestair, one of which goes into the lobby. Rework as a reqmt vs an exception

TG4 PROPOSALS 10/3/2011

PROPOSAL 1
LOBBY REQUIREMENTS CHAPTER 30

713.14 Elevator, dumbwaiter and other hoistways. Elevator, dumbwaiter and other hoistway enclosures shall be constructed in accordance with Section 713 and Chapter 30.

SECTION 3007
ELEVATOR LOBBIES

3007.1 General. Enclosed elevator lobbies shall be provided where required by Section 3007.2 or the following sections.

1. Section 405.4.3 for underground buildings.
2. Sections 407.5.3 and 711.9 for Group I-2 occupancies.
3. Section 1007.4 for areas of refuge.
4. Section 3008.7.2 for fire service access elevators.
5. Section 3009.7.2 for occupant evacuation elevators.

3007.2 ~~**713.14.1**~~ **Enclosed elevator lobby.** An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three stories. The lobby enclosure shall separate the elevator shaft enclosure doors from each floor by fire partitions. In addition to the requirements in Section 708 for fire partitions, doors protecting openings in the elevator lobby enclosure walls shall also comply with Section 716.5.3 as required for corridor walls and penetrations of the elevator lobby enclosure by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1. Elevator lobbies shall have at least one means of egress complying with Chapter 10 and other provisions within this code.
Exceptions:

1. Enclosed elevator lobbies are not required at the level(s) of exit discharge, provided the level(s) of exit discharge 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 712.1 are not required to have enclosed elevator lobbies.

3. Enclosed elevator lobbies are not required where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal.

4. 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. This exception shall not apply to the following:

4.1. Group I-2 occupancies;
4.2. Group I-3 occupancies; and
4.3. Elevators serving floor levels over 75 feet above the lowest level of fire department vehicle access in high-rise buildings.

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.
In addition to the requirements in Section 710 for smoke partitions, doors protecting openings in the smoke partitions shall also comply with Sections 710.5.2.2, 710.5.2.3, and 716.5.9 and duct penetrations of the smoke partitions shall be protected as required for corridors in accordance with Section 717.5.4.1.

6. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 909.21.

7. Enclosed elevator lobbies are not required where the elevator serves only open parking garages in accordance with Section 406.5.

Renumber current Sections 3007 and 3008 accordingly.

Reason: This proposal is editorial in nature but is done with the hope of keeping the lobby requirements easier to apply and more consistent in the future. Section 405.4.3 contains the requirements for elevator lobbies in underground buildings. Sections 407.5.3 and 711.9 contain the requirements for elevator lobbies for the protection of horizontal assemblies in Group I-2 occupancies. The text in Section 713.14.1.1 has been relocated to new Section 3007.1 and editorially revised for consistency. Sections 3007.7.2 and 3008.7.2 (renumbered to 3008.7.2 and 3009.7.2 in this proposal) currently house the requirements for fire service access elevators and occupant evacuation elevators which have lobby construction requirements associated with them. New Section 3007.1 in this proposal now simply references users to the appropriate sections within the code for elevator lobby requirements. This way code users will be clear that there are several types of lobbies and that more than one set of requirements and triggers may apply to them. This also assists with correlation with ASME A17.1. (responsibility of committees needs to be addressed. Suggest that FS still address this new section 3007).

Notes:
No task group opposition to moving to Ch 30

PROPOSAL 2
EXCEPTIONS TO PERMISSIONS

713.14 Elevator, dumbwaiter and other hoistways. Elevator, dumbwaiter and other hoistway enclosures shall be constructed in accordance with Section 713 and Chapter 30.

713.14.1 Elevator hoistway door opening protection required. Elevator hoistway door openings shall be protected in accordance with Section713.14.2 where an elevator hoistway connects more than three stories, is required to be enclosed within a shaft enclosure in accordance with Section 712.1.1 and where any of the following conditions apply.

1. The building is not protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2
2. The building contains a Group I-2 occupancy;
3. The building contains a Group I-3 occupancy;
4. The building contains elevators serving floor levels over 75 feet above the lowest level of fire department vehicle access in high-rise buildings.

Exceptions:
1. Protection of elevator hoistway door openings is not required where the elevator serves only open parking garages in accordance with Section 406.5.
2. Protection of elevator hoistway door openings is not required at the level(s) of exit discharge, provided the level(s) of exit discharge is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1.

713.14.~~1~~2 Elevator hoistway door opening protection options ~~Lobby~~. Where Section 713.14.1 requires protection of the elevator hoistway door opening, one of the following protection options shall be provided.

1.~~-~~An enclosed elevator lobby shall be provided at each floor ~~where an elevator shaft enclosure connects more than three stories. The~~ ~~shall~~ to separate the elevator hoistway shaft enclosure doors from each floor by fire partitions in accordance with Section 708. In addition~~, to the requirements in Section 708 for fire partitions~~, doors protecting openings in the elevator lobby enclosure walls shall ~~also~~ comply with Section 716.5.3 as required for corridor walls. ~~and~~ Penetrations of the enclosed elevator lobby ~~enclosure~~ by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1~~. Elevator lobbies shall have at least one *means of egress* complying with Chapter 10 and other provisions within this code.~~

~~Exceptions:~~
~~1. Enclosed elevator lobbies are not required at the level(s) of exit discharge, provided the level(s) of exit discharge 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 712.1 are not required to have enclosed elevator lobbies.~~

2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway shaft enclosure doors from each floor by smoke partitions in accordance with Section 710 where the building is equipped throughout with an automatic sprinkler system installed in accordance with 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the smoke partitions shall comply with Sections 710.5.2.2, 710.5.2.3, and 716.5.9. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1.

3. ~~Enclosed elevator lobbies are not required where~~ An additional door~~s~~ shall be ~~are~~ provided at ~~the~~ each elevator hoistway door opening in accordance with Section 3002.6. Such door shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal.

~~4. 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. This exception shall not apply to the following:~~
~~4.1. Group I-2 occupancies;~~
~~4.2. Group I-3 occupancies; and~~
~~4.3. Elevators serving floor levels over 75 feet above the lowest level of fire department vehicle access in high-rise buildings.~~

~~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.~~
~~In addition to the requirements in Section 710 for smoke partitions, doors protecting openings in the smoke partitions shall also comply with Sections 710.5.2.2, 710.5.2.3, and 716.5.9 and duct penetrations of the smoke partitions shall be protected as required for corridors in accordance with Section 717.5.4.1.~~

4. ~~6. Enclosed Elevator lobbies are not required where the~~ The elevator hoistway ~~is~~ shall be pressurized in accordance with Section 909.21.

713.14.3 **Means of egress.** Elevator lobbies shall be provided with at least one means of egress complying with Chapter 10 and other provisions in this code.

713.14. 4~~1~~ Areas of refuge. Areas of refuge shall be provided ~~as~~ where required in Section 1007.

Reason: The purpose of this code change is editorial in nature and seeks only to convert the elevator lobby section to one focused on making the current exceptions equal in stature in the code to the main requirement for a lobby. This also removes some of the

confusion with having requirements within some of the exceptions. This proposal focuses on the protection of the elevator opening into the shaft enclosure versus requiring an elevator lobby. This allows the other exceptions to become more clear and equal design options.

PROPOSAL 3
LOBBY SIZE CLARIFICATION

3007.7.4 Lobby size. Regardless of the number of fire service access elevators served by the same elevator lobby, ~~each~~ the enclosed fire service access elevator lobby shall be a minimum of 150 square feet (14 m2) in an area with a minimum dimension of 8 feet (2440 mm).

Reason: This proposal is to clarify that it was not the intent to require additional space for each additional fire service access elevator provided. The initial intent of the size requirement was merely to provide sufficient space to conduct fire fighting operations. The 2012 IBC has a new requirement for a second fire service access elevator which was not related to the section on lobby size. This second elevator was initially discussed as being needed for additional capacity but when discussed on the floor was noted as being more for redundancy.

The current size requirement is the result of a successful Public Comment to Code Change G197-07/08 submitted by the proponent representing the Los Angeles Fire Department. The proponent originally wanted 50 square feet for each additional elevator car served by the lobby but that was disapproved by the General Committee. The Public Comment deleted the 50 square feet and added the minimum dimension requirement of 8 feet. A detailed rationale for that approach can be found in the Commenter's Reason submitted with the Public Comment. So this proposed code change implements and clarifies the intent of the Public Comment that was approved by the ICC governmental voting representatives.

PROPOSAL 4
SMOKE BARRIER CONTINUITY

709.4 Continuity. *Smoke barriers* shall form an effective membrane continuous from outside wall to outside wall and from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, deck or slab above, including continuity through concealed spaces, such as those found above suspended ceilings, and interstitial structural and mechanical spaces. The supporting construction shall be protected to afford the required *fire-resistance rating* of the wall or floor supported in buildings of other than Type IIB, IIIB or VB construction.

Exceptions:

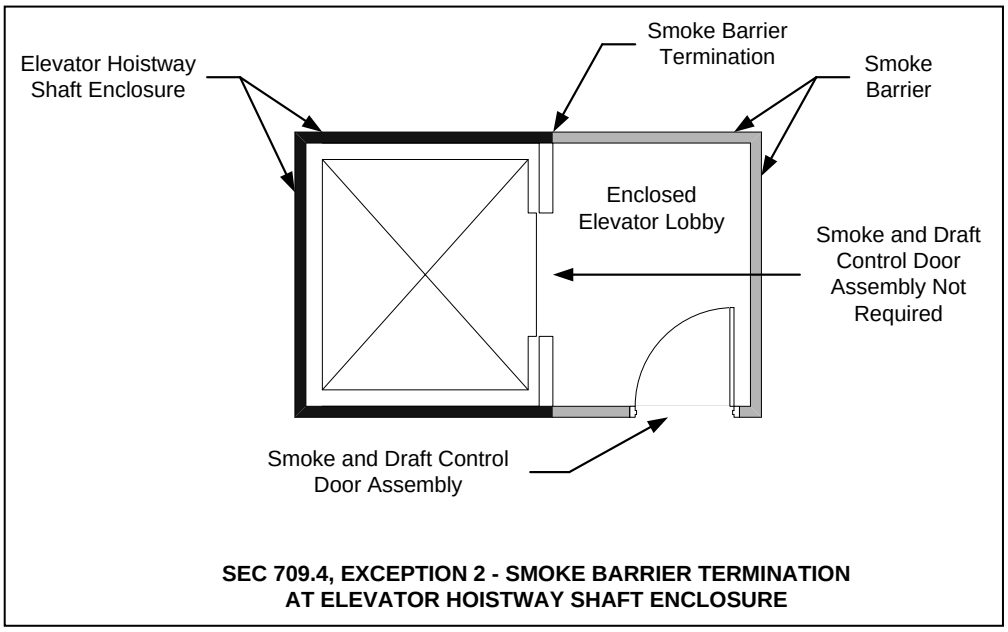
1. Smoke-barrier walls are not required in interstitial spaces where such spaces are designed and constructed with ceilings that provide resistance to the passage of fire and smoke equivalent to that provided by the smoke-barrier walls.

2. Smoke barriers used ~~for~~ to enclose elevator lobbies in accordance with Section 405.4.3, 1007.6.2, 3007.7.2 or 3008.7.2 shall be permitted to terminate at the elevator hoistway shaft enclosure. ~~not required to extend from outside wall to outside wall.~~ A smoke and draft control door assembly as specified in Section 716.5.3.1 shall not be required at each elevator hoistway door opening.

3. Smoke barriers used for areas of refuge in accordance with Section 1007.6.2 are not required to extend from outside wall to outside wall.

Reason: Provisions are necessary to clarify that opening protection at the hoistway opening is not necessary when an enclosed elevator lobby is provided in accordance with Section 405.4.3, 3007.7.2, or 3008.7.2. An enclosed elevator lobby protects the hoistway from smoke migration, therefore the hoistway is already protected. In addition the shaft walls provide sufficient smoke and draft protection to allow the smoke barriers to terminate at those walls.

For Proposal 4:



SEC 709.4, EXCEPTION 2 - SMOKE BARRIER TERMINATION AT ELEVATOR HOISTWAY SHAFT ENCLOSURE

PROPOSAL 5
AREA OF REFUGE CORRELATION

1007.6 Areas of refuge. Every required area of refuge shall be accessible from the space it serves by an accessible means of egress.

1007.6.1 Travel distance. The maximum travel distance from any accessible space to an area of refuge shall not exceed the travel distance permitted for the occupancy in accordance with Section 1016.1.

1007.6.2 Stairway or elevator access. Every required area of refuge shall have direct access to a stairway ~~within an exit enclosure~~ complying with Sections 1007.3 and 1022 or an elevator complying with Section 1007.4.
~~Where an elevator lobby is used as an area of refuge , the shaft and lobby shall comply with Section 1022.9 for smokeproof enclosures except where the elevators are in an area of refuge formed by a horizontal exit or smoke barrier.~~

Delete elevator access from title based on proposed revision

1007.6.3. Enclosed elevator lobbies. Where enclosed elevator lobbies are used as an area of refuge the hoistway shall be pressurized in accordance with Section 909.21. Hoistway pressurization is not required where the elevators are in an area of refuge formed by a horizontal exit or smoke barrier which extends from outside wall to outside wall.

1007.6.~~2~~4 Separation. Each *area of refuge* shall be separated from the remainder of the story by a *smoke barrier* complying with Section 709 or a *horizontal exit* complying with Section 1025. Each *area of refuge* shall be designed to minimize the intrusion of smoke.

Exception: *Areas of refuge* located within an enclosure for *exit access stairways* or *interior exit stairways* *complying with Section 1009.3 or Section 1022*.

1007.6.~~3~~5 Two-way communication. *Areas of refuge* shall be provided with a two-way communication system complying with Sections 1007.8.1 and 1007.8.2.

Reason: This section currently requires that when an elevator lobby is used as an area of refuge that the lobby and the hoistway be protected as a smokeproof enclosure. Reference to the smoke proof enclosure requirements seemed inappropriate as they are focused upon stairs and would not be practical to apply to elevator lobbies. For instance it is unclear if an elevator lobby would be required to have a vestibule. Also if the pressurization option is chosen the criteria and requirements are focused upon stairs not elevator hoistway pressurization. The solution was to provide an equivalent approach in intent that was more focused upon elevators. Therefore the approach was to make an attempt at an alternative solution using the smoke barrier separation (already required for all areas of refuge) and adding hoistway pressurization(Section

909.21) to the requirements. The exception for horizontal exits and smoke barriers was retained and clarified. More specifically the clarification was that smoke barriers are required to extend from outside wall to outside wall not to be confused with the allowance in Section 709.4.

PROPOSAL 6
CORRIDOR SMOKE AND DRAFT ASSEMBLY REQUIREMENTS

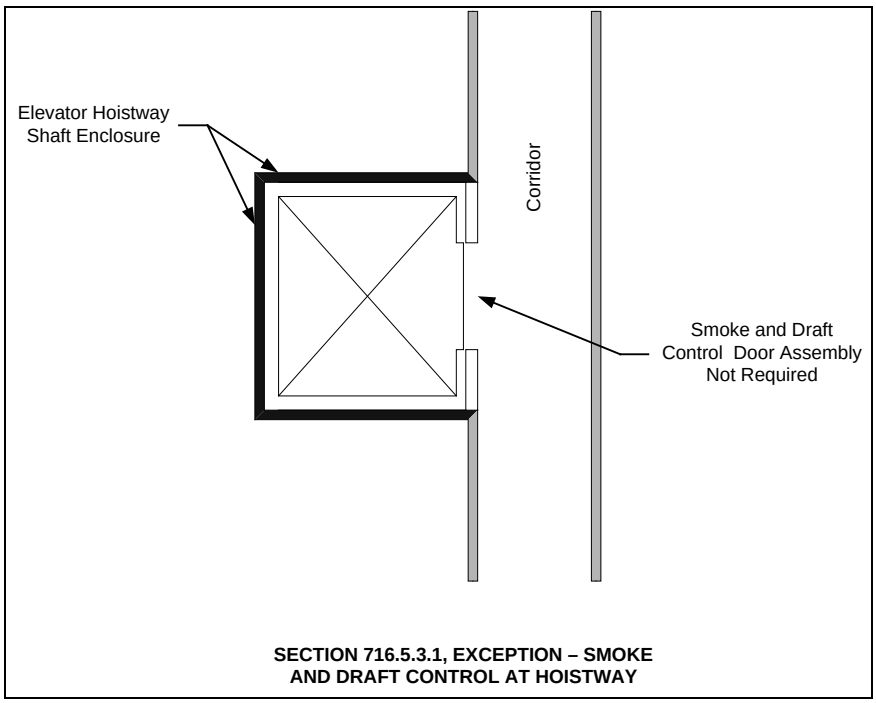
Revise as follows:

716.5.3.1 Smoke and draft control. *Fire door* assemblies shall also meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot (0.01524 $m^3/s \cdot m^2$) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited. Installation of smoke doors shall be in accordance with NFPA 105.

> **Exception:** Where enclosed elevator lobbies are not required by Section 713.14.1, elevator hoistway doors opening into a corridor are not required to meet the requirements for a smoke and draft control door assembly unless Exception 3 to Section 713.14.1 applies.

Reason: This proposal is intended to clarify that when an elevator lobby is not required in accordance with Section 713.14.1 that smoke and draft protection is not required when the hoistway opens into a rated corridor. See figure below. Section 713.14.1 is based upon number of stories and not the fact that such elevators open onto a rated corridor so it is not entirely clear how the code is currently written that this was the intent . The following are the sections that are relevant to this issue and which demonstrate how such confusion could occur. The Lobby provisions are independent from the corridor provisions. To avoid confusion on the application of this exception with the application of exception 3 to Section 713.14.1 reference has been made to the exception in 713.14.1. This makes it clear that this relationship has been considered and it was not intended to still require that exception to be applied.

For Proposal 6:



SECTION 716.5.3.1, EXCEPTION – SMOKE AND DRAFT CONTROL AT HOISTWAY

713.14 Elevator, dumbwaiter and other hoistways. Elevator, dumbwaiter and other hoistway enclosures shall be constructed in accordance with Section 713 and Chapter 30.

713.14.1 Elevator lobby. An enclosed elevator lobby shall be provided at each floor where an elevator shaft enclosure connects more than three *stories*. The lobby enclosure shall separate the elevator shaft enclosure doors from each floor by *fire partitions*. In addition to the requirements in Section 708 for *fire partitions*, doors protecting openings in the elevator lobby enclosure walls shall also comply with Section 716.5.3 as required for *corridor* walls and penetrations of the elevator lobby enclosure by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1. Elevator lobbies shall have at least one *means of egress* complying with Chapter 10 and other provisions within this code.

Exceptions:

1. Enclosed elevator lobbies are not required at the level(s) of *exit discharge*, provided the level(s) of *exit discharge* 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 712.1 are not required to have enclosed elevator lobbies.

3. Enclosed elevator lobbies are not required where additional doors are provided at the hoistway opening in accordance with Section 3002.6. Such doors shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal.

4. 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. This exception shall not apply to the following:

4.1. Group I-2 occupancies;

4.2. Group I-3 occupancies; and

4.3. Elevators serving floor levels over 75 feet above the lowest level of fire department vehicle access in high-rise buildings.

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. In addition to the requirements in Section 710 for smoke partitions, doors protecting openings in the smoke partitions shall also comply with Sections 710.5.2.2, 710.5.2.3, and 716.5.9 and duct penetrations of the smoke partitions shall be protected as required for *corridors* in accordance with Section 717.5.4.1.

6. Enclosed elevator lobbies are not required where the elevator hoistway is pressurized in accordance with Section 909.21.

7. Enclosed elevator lobbies are not required where the elevator serves only *open parking garages* in accordance with Section 406.3.

713.14.1.1 Areas of refuge. Areas of refuge shall be provided as required in Section 1007.

SECTION 1018 CORRIDORS

1018.1 Construction. *Corridors* shall be fire-resistance rated in accordance with Table 1018.1. The *corridor* walls required to be fire-resistance rated shall comply with Section 709 for *fire partitions*.

Exceptions:

1. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group E where each room that is used for instruction has at least one door opening directly to the exterior and rooms for assembly purposes have at least one-half of the required *means of egress* doors opening directly to the exterior. Exterior doors specified in this exception are required to be at ground level.

2. A *fire-resistance rating* is not required for *corridors* contained within a dwelling or sleeping unit in an occupancy in Group R.

3. A *fire-resistance rating* is not required for *corridors* in *open parking garages*.

4. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group B which is a space requiring only a single *means of egress* complying with Section 1015.1.

5.Corridors adjacent to the exterior walls of buildings shall be permitted to have unprotected openings on unrated exterior wall where unrated walls are permitted by Table 602 and unprotected openings are permitted by Table 705.8.

SECTION 708 FIRE PARTITIONS

708.1 General. The following wall assemblies shall comply with this section.

1. Walls separating *dwelling units* in the same building as required by Section 420.2.

2. Walls separating *sleeping units* in the same building as required by Section 420.2.

3. Walls separating tenant spaces in *covered mall buildings* as required by Section 402.7.2.

4. Corridor walls as required by Section 1018.1.

5. Elevator lobby separation as required by Section 713.14.1.

708.2 Materials. The walls shall be of materials permitted by the building type of construction.

708.3 Fire-resistance rating. Fire partitions shall have a *fire-resistance rating* of not less than 1 hour.

Exceptions:

1. Corridor walls permitted to have a $^1/_2$ hour *fire-resistance rating* by Table 1018.1.

2. *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.

708.6 Openings. Openings in a *fire partition* shall be protected in accordance with Section 716.

SECTION 710 SMOKE PARTITIONS

710.1 General. Smoke partitions installed as required elsewhere in the code shall comply with this section.

710.5 Openings. Openings in smoke partitions shall comply with Sections 710.5.1 and 710.5.2.

710.5.1 Windows. Windows in smoke partitions shall be sealed to resist the free passage of smoke or be automatic-closing upon detection of smoke.

710.5.2 Doors. Doors in smoke partitions shall comply with Sections 710.5.2.1 through 710.5.2.3.

710.5.2.1 Louvers. Doors in smoke partitions shall not include louvers.

710.5.2.2 Smoke and draft control doors. Where required elsewhere in the code, doors in smoke partitions shall meet the requirements for a smoke and draft control door assembly tested in accordance with UL 1784. The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot (0.015424 $m^3/(s \cdot m^2)$) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature test and the elevated temperature exposure test. Installation of smoke doors shall be in accordance with NFPA 105.

SECTION 716 OPENING PROTECTIVES

716.1 General. Opening protectives required by other sections of this code shall comply with the provisions of this section.

716.5 Fire door and shutter assemblies. Approved *fire door* and fire shutter assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 716.5.1, 716.5.2 or 716.5.3 and the *fire protection rating* indicated in Table 716.5. *Fire door* frames with transom lights, sidelights or both shall be permitted in accordance with Section 716.5.6. *Fire door* assemblies and shutters shall be installed in accordance with the provisions of this section and NFPA 80.

Exceptions:

1. Labeled protective assemblies that conform to the requirements of this section or UL 10A, UL 14B and UL 14C for tin-clad *fire door* assemblies.

2. Floor *fire door* assemblies in accordance with Section 711.8.

TABLE 716.5 OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS.

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE	FIRE RATED GLAZING MARKING DOOR VISION PANEL [e]	MINIMUM SIDELIGHT/ TRANSOM ASSEMBLY RATING (hours)	FIRE RATED GLAZING MARKING SIDELITE/ TRANSOM PANEL
Fire partitions: Corridor walls	0.5	1/3[b]	Maximum size tested	D-20	1/3	D-H- OH-20

716.5.3 Door assemblies in corridors and smoke barriers. *Fire door* assemblies required to have a minimum *fire protection rating* of 20 minutes where located in *corridor* walls or *smoke barrier* walls having a *fire-resistance rating* in accordance with Table 716.5 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream test.

Exceptions:

1. Viewports that require a hole not larger than 1 inch (25 mm) in diameter through the door, have at least a 0.25-inch-thick (6.4 mm) glass disc and the holder is of metal that will not melt out where subject to temperatures of 1,700°F (927°C).
2. *Corridor* door assemblies in occupancies of Group I-2 shall be in accordance with Section 407.3.1.
3. Unprotected openings shall be permitted for *corridors* in multitheater complexes where each motion picture auditorium has at least one-half of its required *exit* or *exit access doorways* opening directly to the exterior or into an *exit* passageway.
4. Horizontal sliding doors in *smoke barriers* that comply with Sections 408.3 and 408.8.4 in occupancies in Group I-3.

PROPOSAL 7
TERMINOLOGY FOR ELEVATOR LOBBIES

Add new definitions as follows:

ELEVATOR LOBBY. A space (enclosed or unenclosed) in front of the elevator hoistway opening where occupants exit or enter an elevator.

Reason: There is often confusion with the term lobby versus elevator lobby . This provides a specific definition for an elevator lobby and also clarifies that lobbies can be open or enclosed. Often the term elevator lobby is used to simply describe the place where people enter or exit a lobby and is not necessarily an enclosed space.

PROPOSAL 8
LINKS TO 3008 AND 3007

713.14.1.1 Areas of refuge. Where an area of refuge is required and an enclosed elevator lobby is provided to serve as an area~~s~~ of refuge, the enclosed elevator lobby shall comply with ~~as required in~~ Section 1007.6.

713.14.1.2 Fire Service Access Elevators. Where fire service access elevators are provided, enclosed elevator lobbies shall comply with Section 3007.

713.14.1.3 Occupant Evacuation Elevators. Where occupant evacuation elevators are provided, enclosed elevator lobbies shall comply with Section 3008.

713.14.1.4 Underground buildings. Where enclosed elevator lobbies are required for underground buildings such lobbies shall comply with Section 405.4.3.

713.14.1.5 Group I-2 occupancies. Enclosed elevator lobbies required in Group I-2 Occupancies in accordance with Sections 407.5.3 and 711.9 shall comply with Section 713.14.1.

Reason. This proposal simply provides clarification as to where all the enclosed elevator lobby requirements are located in other portions of the code. Section 713.14.1.1 was revised to be consistent in approach to the new Sections 713.14.1.2 and 713.14.1.3. Sections 713.14.1.4 and 713.14.5 were added to be consistent with the concept of pointing to other relevant sections requiring enclosed elevator lobbies. If provisions are moved from Chapter 7 to Chapter 30 this proposal is no longer necessary.

PROPOSAL 9
LOBBY SIZE CLARIFICATION

3007.7.4 Lobby size. Enclosed fire service access elevator lobby shall be a minimum of 150 square feet (14 m2) in an area with a minimum dimension of 8 feet (2440 mm). Where elevator lobbies also serve an elevator that is part of an accessible means of egress ~~in accordance with Section 1007.4,~~ the elevator lobby size shall be increased to accommodate wheelchairs spaces in accordance with 1007.6.1.

Reason: Where building are five stories or taller, one of the accessible means of egress must be provided by an elevator with standby power. While Section 1007.3 does allow for no area of refuge in a sprinklered building, the occupant will typically move into the fire service access elevator lobby to wait for fire department assistance to evacuate. Space should be made available so that both assisted evacuation and fire department staging can occur in the same space, even though hopefully this will be for a minimum amount of time. In addition, this will help clarify that one elevator can serve both purposes.

Notes:

- Need to coordinate section cross references with related proposals
- This is an infinite loop with references.
- Need to specifically address that a fire service access elevator can be the same elevator used for accessible means of egress. The lobby needs to be able to be used for both purposes – with or without increase for wheelchair spaces. In needs to be clear that the lobby can be used for both purposes. Fire officials say the lobby is limited to their use, therefore there needs to be a 2nd lobby for accessible means of egress.
- Also clarify that when a fire serve elevator is used that the lobby size of 150 sq.ft. is not added to the size for the occupant evacuation lobby size for occupants served.

TG RISK ASSESSMENT – PROPOSAL

HOISTWAY VENTING

Option A – simply exempting all sprinklered buildings

SECTION 3004
HOISTWAY VENTING

3004.1 Vents required. Hoistways of elevators and dumbwaiters penetrating more than three stories shall be provided with a means for venting smoke and hot gases to the outer air in case of fire.

Exceptions:

1. ~~In occupancies of other than Groups R-1, R-2, I-1, I-2 and similar occupancies with overnight sleeping units ,~~ Venting of hoistways is not required where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Sidewalk elevator hoistways are not required to be vented.
3. Elevators contained within and serving open parking garages only.
4. Elevators within individual residential dwelling units .

3004.2 Location of vents. Vents shall be located at the top the hoistway and shall open either directly to the outer air or through noncombustible ducts to the outer air. Noncombustible ducts shall be permitted to pass through the elevator machine room, provided that portions of the ducts located outside the hoistway or machine room are enclosed by construction having not less than the fire-resistance rating required for the hoistway. Holes in the machine room floors for the passage of ropes, cables or other moving elevator equipment shall be limited as not to provide greater than 2 inches (51 mm) of clearance on all sides.

3004.3 Area of vents. Except as provided for in Section 3004.3.1, the area of the vents shall not be less than 31/2 percent of the area of the hoistway nor less than 3 square feet (0.28 m2) for each elevator car, and not less than 31/2 percent nor less than 0.5 square feet (0.047 m2) for each dumbwaiter car in the hoistway, whichever is greater. Of the total required vent area, not less than one-third shall be permanently open. Closed portions of the required vent area shall consist of openings glazed with annealed glass not greater than 1/8 inch (3.2 mm) in thickness.

Exception: The total required vent area shall not be required to be permanently open where all the vent openings automatically open upon detection of smoke in the elevator lobbies or hoistway, upon power failure and upon activation of a manual override

control. The manual override control shall be capable of opening and closing the vents and shall be located in an approved location.

3004.3.1 Reduced vent area. Where mechanical ventilation conforming to the International Mechanical Code is provided, a reduction in the required vent area is allowed provided that all of the following conditions are met:

1. The occupancy is not in Group R-1, R-2, I-1 or I-2 or of a similar occupancy with overnight sleeping units.
2. The vents required by Section 3004.2 do not have outside exposure.
3. The hoistway does not extend to the top of the building.
4. The hoistway and machine room exhaust fan is automatically reactivated by thermostatic means.
5. Equivalent venting of the hoistway is accomplished.

3004.4 Plumbing and mechanical systems. Plumbing and mechanical systems shall not be located in an elevator shaft.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft provided they are indirectly connected to the plumbing system.

Reason: The purpose of hoistway venting is unclear in terms of the original intent. Provisions date back to the 1950s, but appear to be focused more upon fire fighting and post-fire overhaul. Since that time, the provisions have shifted for vents to be readily available (always open) or to operate automatically via a smoke detector in the lobby or the hoistway. The concern is that in a sprinklered building such venting serves little purpose and may have the effect of drawing smoke through the building where it is not appropriate. This is a specific concern after consideration of overall smoke movement by the CTC Elevator Lobby Study Group related to stack effect and preventing smoke movement throughout the building. This provision also conflicts with the allowance for hoistway pressurization in accordance with Section 909.21 which does not currently exempt hoistway venting when using pressurization.

Option B- Deleting hoistway venting requirements

SECTION 3004
HOISTWAY VENTING

~~**3004.1 Vents required.** Hoistways of elevators and dumbwaiters penetrating more than three stories shall be provided with a means for venting smoke and hot gases to the outer air in case of fire.~~

~~**Exceptions:**~~

~~1. In occupancies of other than Groups R-1, R-2, I-1, I-2 and similar occupancies with overnight sleeping units , Venting of hoistways is not required where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2.~~

~~2. Sidewalk elevator hoistways are not required to be vented.~~

~~3. Elevators contained within and serving open parking garages only.~~

~~4. Elevators within individual residential dwelling units .~~

~~**3004.2 Location of vents.** Vents shall be located at the top the hoistway and shall open either directly to the outer air or through noncombustible ducts to the outer air. Noncombustible ducts shall be permitted to pass through the elevator machine room, provided that portions of the ducts located outside the hoistway or machine room are enclosed by construction having not less than the fire-resistance rating required for the hoistway. Holes in the machine room floors for the passage of ropes, cables or other moving elevator equipment shall be limited as not to provide greater than 2 inches (51 mm) of clearance on all sides.~~

~~**3004.3 Area of vents.** Except as provided for in Section 3004.3.1, the area of the vents shall not be less than 31/2 percent of the area of the hoistway nor less than 3 square feet (0.28 m2) for each elevator car, and not less than 31/2 percent nor less than 0.5 square feet (0.047 m2) for each dumbwaiter car in the hoistway, whichever is greater. Of the total required vent area, not less than one-third shall be permanently open. Closed portions of the required vent area shall consist of openings glazed with annealed glass not greater than 1/8 inch (3.2 mm) in thickness.~~

~~**Exception:** The total required vent area shall not be required to be permanently open where all the vent openings automatically open upon detection of smoke in the elevator lobbies or hoistway, upon power failure and upon activation of a manual override control. The manual override control shall be capable of opening and closing the vents and shall be located in an approved location.~~

~~**3004.3.1 Reduced vent area.** Where mechanical ventilation conforming to the International Mechanical Code is provided, a reduction in the required vent area is allowed provided that all of the following conditions are met:~~

~~1. The occupancy is not in Group R-1, R-2, I-1 or I-2 or of a similar occupancy with overnight sleeping units .~~

~~2. The vents required by Section 3004.2 do not have outside exposure.~~

~~3. The hoistway does not extend to the top of the building.~~

~~4. The hoistway and machine room exhaust fan is automatically reactivated by thermostatic means.~~
~~5. Equivalent venting of the hoistway is accomplished.~~

3004 Plumbing and Mechanical Systems

3004.4 General ~~Plumbing and mechanical systems~~. Plumbing and mechanical systems shall not be located in an elevator shaft.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the shaft provided they are indirectly connected to the plumbing system.

Reason: The purpose of hoistway venting is unclear in terms of the original intent. Provisions date back to the 1950s but appear to be focused more upon fire fighting and post-fire overhaul. Since that time, the provisions have shifted for the vents to be readily available (always open) or to operate automatically via a smoke detector in the lobby or the hoistway. The concern is that such venting may have the effect of drawing smoke through the building where it is not appropriate. This is a specific concern after consideration of overall smoke movement by the CTC Elevator Lobby Study Group related to stack effect and preventing smoke movement throughout the building. This provision also conflicts with the allowance for hoistway pressurization in accordance with Section 909.21 which does not currently exempt hoistway venting when using pressurization. Furthermore, the requirement for hoistway venting has been removed from the ASME/ANSI Elevator Code; no conflict will result from this change.

Notes
Delete vents for unsprinklered bldgs?
History of vents in the code has evolved to just vents for elevators….no technical justification
Fire service typically does not use the vents/rely on the vents during FF operations
Within scope of A of S?

Lobby package of proposals
Stand alone changes, keep them separate
Not necessarily related to the when and where (scope trigger), but related to the how to fix lobby provisions regardless of when they are required
Fixes will address unsprinklered bldgs with lobbies