Life Safety Evaluation Information Sheet

The Life Safety Evaluation is an assessment of the impact of the overall safety of occupants provided by the building's features, such as stairwells, elevators and communication systems. The Life Safety Evaluation also determines if an existing residential or landmark high-rise building must be outfitted with a fire suppression sprinkler system.

Chicago Building Code section 13-196-205 requires that every building over 80 feet in height must have a full sprinkler system by January 1, 2017. However, exceptions 1 through 7 of this code section allow high-rise buildings classified as "non-transient residential" class (A-2) or as landmark buildings to utilize The Life Safety Evaluation (LSE). The LSE can determine if the building is has enough alternative life and fire safety features so that a sprinkler system is not required.

The LSE evaluates three basic criteria of a buildings safety (1. fire safety, (2. means of egress and (3. general building safety. These three criteria are evaluated using 18 categories such as Building Height, Protection of Vertical Openings and Smoke Detection to measure the overall level of building safety. A building must achieve passing scores in all basic safety criteria to demonstrate that it does not need to install the sprinkler system.

A building may achieve these passing LSE scores either in the initial LSE evaluation by the licensed design professional or the licensed design professional may propose alternative safety upgrades for the building. If a building is unable to achieve a passing score, then it must have a complete sprinkler system by January, 2017 in conformance with the requirements of Code Section 13-196-205.

Basic Life Safety Criteria

**Fire Safety** Fire safety measures active and passive means of combating fires. This includes the building's ability to contain a fire to its place of origin using passive means, such as fire-rated walls, doors and ceilings, and the ability to extinguish a fire by active means, such as Fire Department intervention or a sprinkler system. Fire Safety is also determined by the endurance of existing fire barriers, such as doors or walls, and the ability of the building’s structural frame to withstand exposure to fire without failure.

**Means of Egress** This measures the ability of the building occupants to escape from a fire to a safe location either inside or outside of the building. This is also determined by the ability to detect and notify occupants about a fire condition and the capability of the fire department to communicate with occupants before and after a fire.

**General Safety** This a measure of the overall fire safety level of the building.
Life Safety Categories

**Category 1  Building Height**
The Life Safety Evaluation considers the height of the building for obvious reasons. The taller the building, the more time it will take residents to totally and simultaneously evacuate the building, and the more time it will take the Fire Department to fight a fire on an upper floor. Also, as the building increases in height, it becomes more difficult to achieve the required water pressure for fire hoses.

Currently, the maximum height of a fire department aerial ladder is 100 feet. Therefore, buildings higher than 100 feet receive no points in the evaluation.

**Category 2  Construction Classification**
This category evaluates the ability of the building’s structural system to withstand exposure to fire. Fire barriers and building exits, such as interior or exterior stairs, depend on the stability of the structural system for their support and operation during a fire.

Most high rise buildings in Chicago are constructed with non-combustible concrete or steel framing which has been protected to resist exposure of fire. The three most fire resistive categories of construction in the Chicago Building Code range from 1C, (the lowest) to 1B, and then to 1A (the highest). The more fire resistive the construction of the building, the more points a building may receive on the evaluation.

Buildings which utilize a perimeter ‘curtain wall’ building enclosure receive fewer points in this category because there is a gap between the inside face of the perimeter curtain wall and the concrete floor slab which, if not properly sealed and fire-stopped, will allow the passage of smoke and flame to the floor above.

**Category 3  Compartment Area**
This category measures the life safety risk to building occupants based on the size of the building floor area and whether the building floor is sub-divided by fire-rated walls and doors into smaller ‘fire compartments’ which contain and limit a fire. Life safety risk to occupants and firefighters increases as the size of the fire compartment increases, so that more of the building is involved, more occupants are exposed, and more combustible material is present which can increase the size of the fire.

**Category 4  Residential Dwelling Unit Separations**
This category evaluates the fire separation between two adjacent residential dwelling units. The Chicago Building Code requires that units be separated with complete partitions having at least a one-hour fire rating. These partitions must extend from the floor to the underside of the structural floor deck above.
Category 5  Corridor Partition Walls
This category evaluates the fire separation between a residence and the common exit corridor which serves that unit. To protect the common exit corridor from a fire within a unit, the Chicago Building Code requires that walls or partitions must be at least one-hour, fire-rated construction and extend from the floor to the underside of the structural floor deck above. Corridor walls are required by the LSE to have full doors with self closing devices which will close and latch to limit the spread of fire and smoke to the corridor. Corridor walls which have transoms above the door do not meet this requirement.

Category 6  Vertical Openings
This category evaluates how vertical shafts which connect multiple floors (escalators, atriums, stair shafts, trash chutes, duct and elevator shafts) are constructed and protected to limit the spread of fire and smoke. Incomplete or unprotected vertical shafts act like chimneys during a fire allowing smoke, heat and toxic gases to spread rapidly to other floors and areas of the building, thereby endangering the occupants and firefighter operations.

The Chicago Building Code requires walls with at least a 1 hour fire rating be in place around shaft enclosures in existing buildings. Doors and door frames located in shafts are also required to have at least a 1-hour fire rating, self closing devices and the capability for the door to latch in the closed position.

Category 7  HVAC (Heating Ventilation and Air Conditioning) Systems
This category evaluates the heating /cooling system for the building. Some buildings have centralized forced air heating and cooling systems. These systems have ductwork which serve multiple dwelling units and extend through multiple floors. During a fire, this type of system can allow flames, smoke and toxic gases to spread through the duct system to multiple dwelling units and endanger building occupants.

Buildings which have an older central boiler with steam radiators or hot water heating are considered less hazardous because there is no duct system, only small diameter piping. Buildings in which each unit has its own furnaces or through the wall heating and cooling are also considered less hazardous because these units serve only a single dwelling unit or a single floor.

Category 8  Smoke Detection
Smoke detectors have an excellent record of saving lives. This category measures the ability of smoke detectors within a building to detect smoke from a fire and notify occupants. The Chicago Building Code requires that all dwelling units be provided with a minimum of one smoke detector or with smoke detectors located within 15’-0” of any bedroom. Beyond meeting this baseline requirement, a building may achieve additional points for their LSE by installing additional smoke detectors in the common areas of the building including corridors, elevator lobbies and common storage rooms.
**Category 9  Communications**
This category evaluates the capability of the fire alarm system to provide information to or receive information from building occupants or the fire department during a fire and to transmit fire alarm signals to the fire department via a central station alarm service. The voice communication systems must have a one way communication system and/or a two way communication system.

A one-way voice communication system serves as a public address system connecting the fire control panel in the building lobby to speakers located in elevators, elevator lobbies, corridors at intervals of 75 feet, doors to the exit stairs and every fifth floor of the exit stairwells. This system allows a fire incident commander at the fire control panel to broadcast instructions and updates on the status of the fire to building residents.

A two-way voice communication system is a hardwired telephone located in the exit stairwells at intervals of every five floors. This system allows firefighters to speak with the incident commander. Residents who are also using the exit stairs for evacuation may also utilize the phones for emergency communication with the incident commander.

**Category 10  Smoke Control**
This category evaluates the ability of a building to control the movement of smoke from a fire and the ability to release smoke trapped inside of the building using either natural ventilation such as operable windows or mechanical systems such as a smokeproof tower or a stair pressurization system. This category is important because reducing smoke concentration in exit paths or areas of refuge makes it safer for occupants to remain in these areas and improves visibility for movement by both the occupants and fire fighter operations.

**Category 11  Means of Egress**
This category evaluates the number of exit routes available to building occupants on a fire floor. The number of exit routes directly affects their ability to escape from a fire. If the building’s interior exit stairs have missing or incomplete protective enclosures or the enclosures or stair doors do not meet the required minimum one-hour fire rating as evaluated in Category 6 (Vertical Openings), it can be difficult for a building to meet the minimum requirement of two exit routes. Additionally, this category tests the requirement that stairway doors be unlocked to allow re-entry by occupants from the stair.

**Category 12  Dead End Corridors**
This category evaluates the length of dead end corridor that an occupant must travel before they come to a point where they have access to two exit stairs. The greater the length occupants must travel where they are confined to a single means of egress, the greater the danger of fire blocking their means of escape.
Category 13  Maximum Exit Travel Distance
This category measures the length of travel from the farthest (most remote) point in the building or the individual floor to the nearest exit stair. The longer the exit travel distance, the greater the danger of occupants becoming lost, confused or affected by smoke before reaching a safe area.

Category 14  Elevator Controls
This category evaluates whether or not the building elevators are equipped with control features designed to increase occupant safety and assist firefighter operations. These systems are:

“Phase I Emergency Recall”
1.) Allows firemen using a dedicated key inserted into the first-floor elevator door jamb to override the elevator controls and bring the elevator to the lobby for firefighter use.
2.) Is initiated by smoke detectors located in the elevator lobbies or sprinkler water flow switches. The recall system will override the elevator controls and bring the elevators down to the open position at the elevator lobby rendering the cars inoperable except for use by the fire department. This system reduces the risk of occupant’s exposure in an elevator cab to fire on a fire floor.

“Phase II Firefighter Emergency Operation”
1.) Allows firemen use of a dedicated key to operate the elevator cars to move firefighters with their equipment or to evacuate people from the upper floors of the building.

Category 15  Emergency Lighting
This category evaluates the availability and reliability of a building’s emergency lighting system. Visibility in a fire is reduced due to the accumulation of smoke. Additionally, the loss of electrical power due to a fire may interrupt normal building power and lighting. With reduced visibility, occupants may become disoriented and unable to find or use the exit paths within the building. Emergency power provides a secondary source of power, such as battery powered units or an emergency generator, to keep emergency lighting operational during a fire emergency.

Category 16  Mixed Occupancies
This category evaluates the required fire separations and conditions within a building between different classes of occupancy and use. For example, within a building, a parking garage area (Class H3 Storage) is required by the Chicago Building Code to be separated from residential (Class A-2) portions by walls, doors and floors with a minimum four-hour fire resistance rating.

Category 17  Automatic Sprinklers
This parameter evaluates whether a building has sprinkler protection for corridors, elevator lobbies and storage areas. Sprinklers reduce the rate of burning and the amount of smoke developed by a fire. Sprinklers are often successful at limiting fire to the location where it originated. Because sprinklers keep the fire smaller, occupants have more time for escape from the fire area.
Category 18  Auxiliary Uses
This category verifies the extent of spaces classified "auxiliary use."
Rooms and spaces normally provided and incidental to the main use of the building while under the same management and control are classified as "auxiliary uses." For a high-rise residential building, such spaces might include a workout room, lockers and showers, a suite of offices for the management company, a party room or tenant storage spaces. As long as auxiliary use spaces do not exceed five percent of the total floor area, these spaces are not required to be separated from other portions of the building with the fire protective walls, doors or floors required for a different use or mixed occupancy.