HOUSTON
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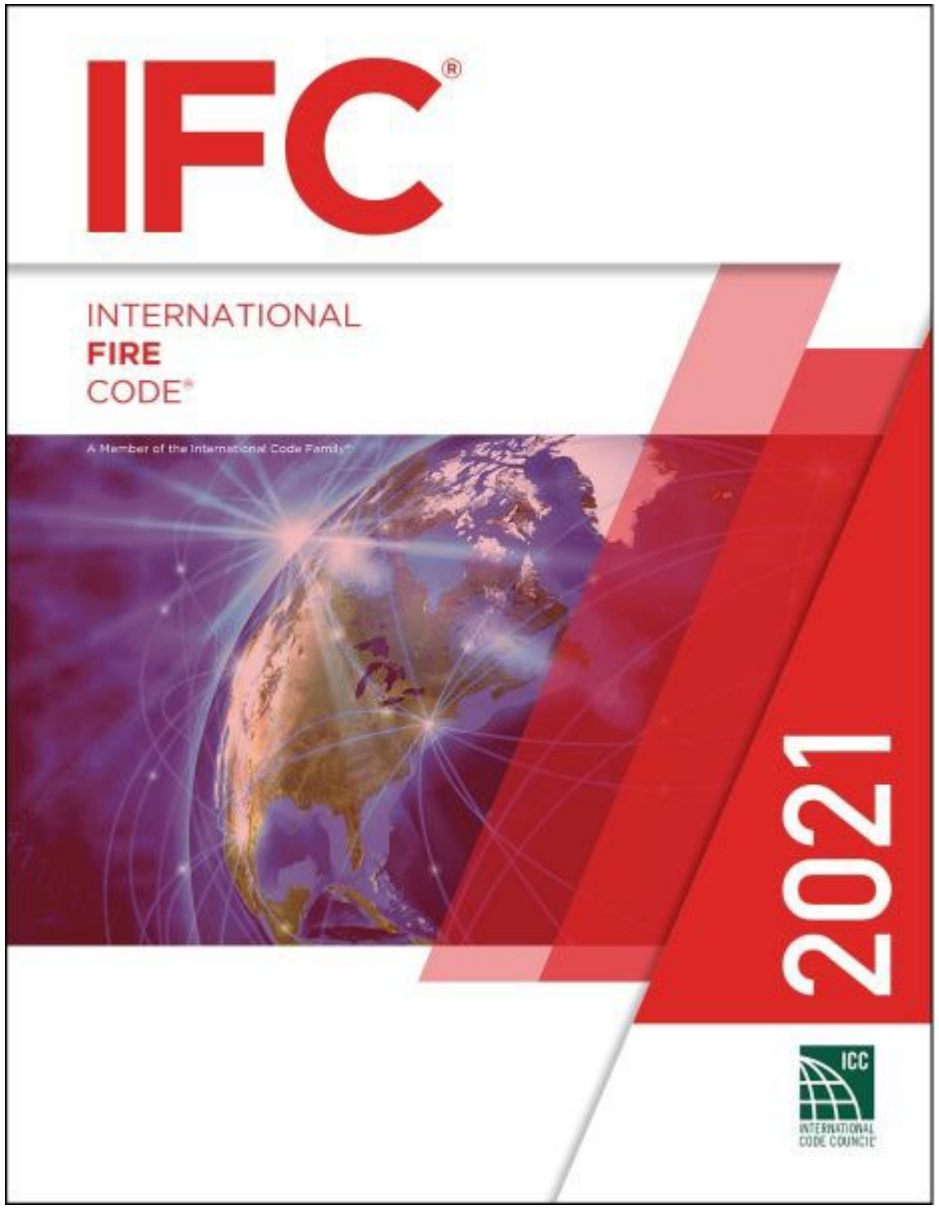
HOUSTON CONSTRUCTION CODE MODERNIZATION

SIGNIFICANT CODE CHANGES & HIGHLIGHTS OF THE 2015 TO 2018 AND 2018 TO 2021 INTERNATIONAL FIRE CODE (IFC)



2021 INTERNATIONAL FIRE CODE

Significant changes to base code requirements from 2015 to 2018 and 2018 to 2021

Changes and updates to City of Houston amendments

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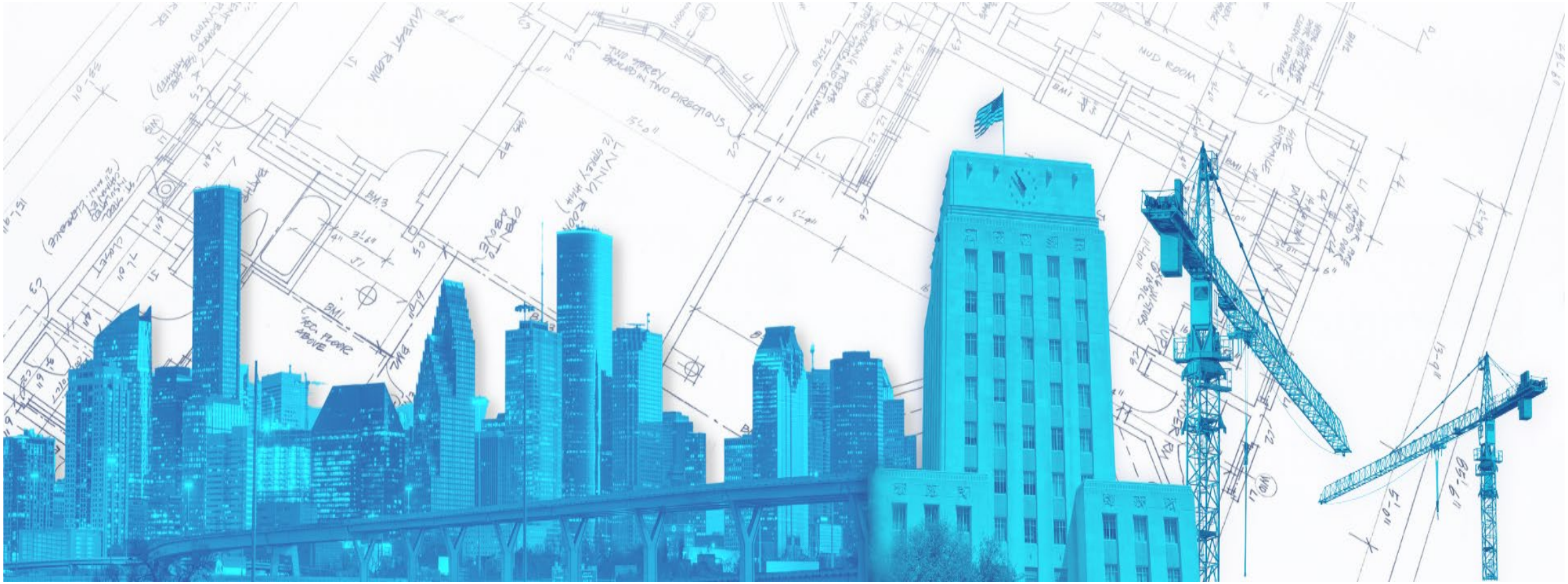
IFC CHAPTER 3 GENERAL REQUIREMENTS



2018 IFC 314.4: INDOOR DISPLAY OF VEHICLES

- Modifies when vehicles are allowed to be located indoors for display
  - Clarification: applies to both liquid-fueled vehicles and gaseous-fueled
  - Allowed when batteries are disconnected ➔ disconnected except where fire code official requires that the batteries remain connected to maintain safety features

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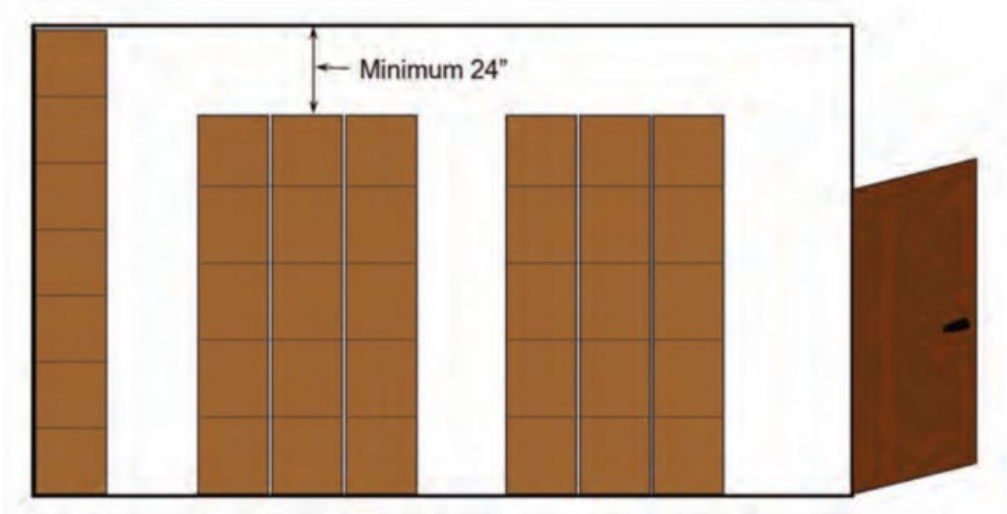
The battery on vehicles located indoors needs to remain connected in situations where disconnection will result in loss of safety monitoring systems.

2018 IFC 315.1, 315.7, 105.6.29: OUTDOOR PALLET STORAGE

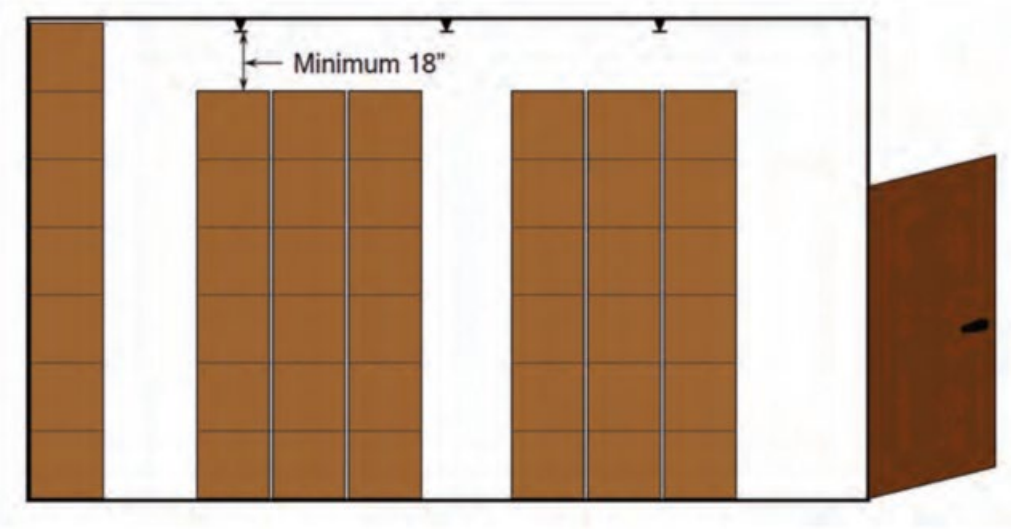
- New exception to requirements in Section 315 for wood and wood composite pallets
  - Exempt from Section 315 requirements if stored outdoors at pallet manufacturing/recycling facilities and comply with Section 2810
- New Section 315.7: Outdoor pallet storage
  - Addresses height limitation, separation to buildings and property lines, and pallet type for the outdoor storage of idle pallets
- Modification to Section 105.6.29: Miscellaneous combustible storage
  - Includes combustible pallets to section

2018 IFC 315.3.1: CEILING CLEARANCE FOR INDOOR STORAGE

- New exceptions for ceiling clearance requirements for storage in buildings
  - Ceiling clearance is not required for storage along walls for both sprinklered and non-sprinklered buildings



Storage in a nonsprinklered room can extend to the ceiling along the walls, but must maintain 24 inches clear to the ceiling in the remainder of the room.



Storage in a room with sprinklers can extend to the ceiling along the walls, but must maintain 18 inches clear below the fire sprinkler deflectors in the remainder of the room.

2018 IFC 319: MOBILE FOOD PREPARATION VEHICLES

- New Section 319: Mobile Food Preparation Vehicles
  - Establishes requirements for cooking equipment, storage, venting, and alarms for mobile food preparation vehicles

2021 IFC 320, 202: ADDITIVE MANUFACTURING (3D PRINTING)

- Section 202: Defines 3D printer and additive manufacturing
  - Establishes industrial vs non-industrial additive manufacturing
- New Section 320: Establishes requirements for additive manufacturing and 3D printing

Photo courtesy of Getty Images

This 3D printer is producing a steel part utilizing the additive manufacturing process.

2021 IFC 321, 321.1: EXTERIOR ARTIFICIAL COMBUSTIBLE VEGETATION

- Regulates artificial combustible vegetation on roofs and near building
  - Vegetation permanently-installed, 6+ feet tall, and within 5 feet of building must comply with Chapter 8 requirements
  - Exception for vegetation 30+ feet away from building

In July 2015, combustible artificial vegetation ignited on the pool deck at the Las Vegas Cosmopolitan Hotel, Las Vegas, NV. The vegetation was artificial palm trees.

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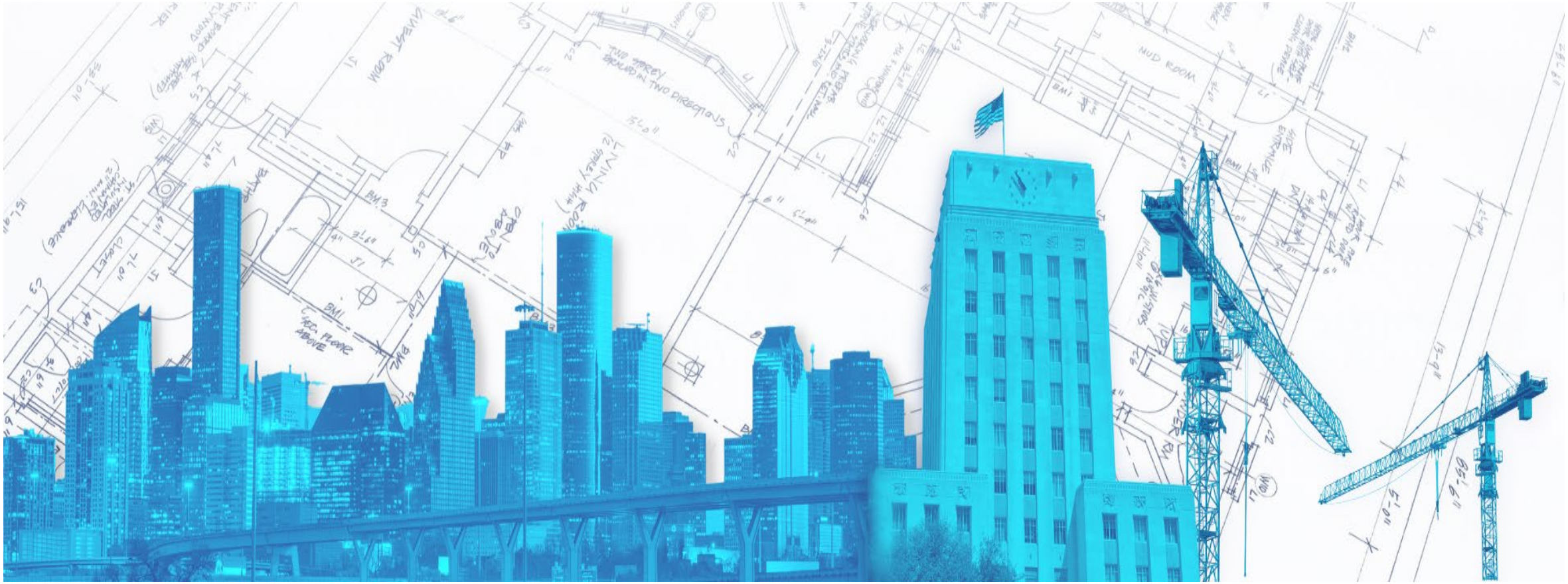
IFC CHAPTER 4 EMERGENCY PLANNING AND PREPAREDNESS



2018 IFC 403.12.3: CROWD MANAGERS

- Increase requirements for the requirement of crowd managers
  - Required in gatherings of 1,000 ➔ 500 people
- Minimum requirements: one manager every 250 people ➔ minimum of two trained managers or one trained manager every 250 people under 1,000 people
  - New exception: not required for outdoor events under 1,000 people
  - New exception: not required for assembly occupancies exclusively for religious worship with occupant load under 1,000 people

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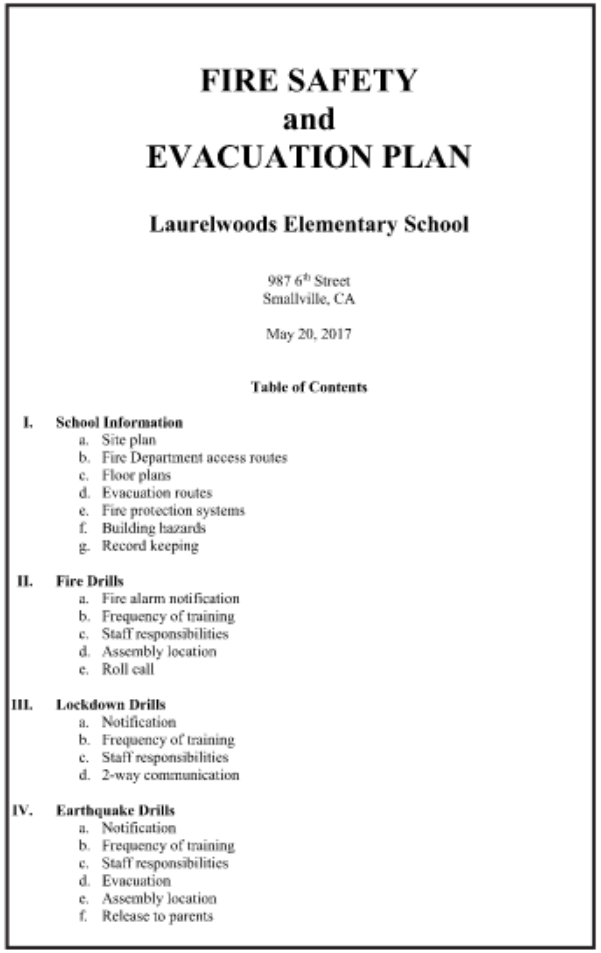
Crowd managers are required to be trained. Training is available via the internet and a link is available through the ICC Preferred Provider Program at www.crowdmanagers.com.

2018 IFC 404.2.3, 404.2.3.1, 404.2.3.2, 404.2.3.3: LOCKDOWN PLANS

- Revises entirety of 404.2.3: Lockdown plans
  - New requirements that the plan must be approved by the fire code official and for plans to include identification, security measures, means and methods of initiation, reporting and communication, and drills



FIRE SAFETY and EVACUATION PLAN

Laurelwoods Elementary School

987 6th Street
Smallville, CA

May 20, 2017

Table of Contents

Table of contents for a sample fire safety and evacuation plan.

2021 IFC 405.1, 405.2, TABLE 405.3, 405.5: EMERGENCY DRILLS

- Specifies both emergency and lockdown drills as separate and non-substitutable
- Requires actual evacuation for occupants during drills
  - Exceptions for certain Group I occupancies/conditions, ambulatory care facilities, and Group R-4 occupancies
- Clarifies fire and evacuation drill frequency and participation
  - Required participation in certain occupancies: employees ➔ staff
  - Allowance to adjust evacuation drills based on weather conditions now applicable to all occupancies

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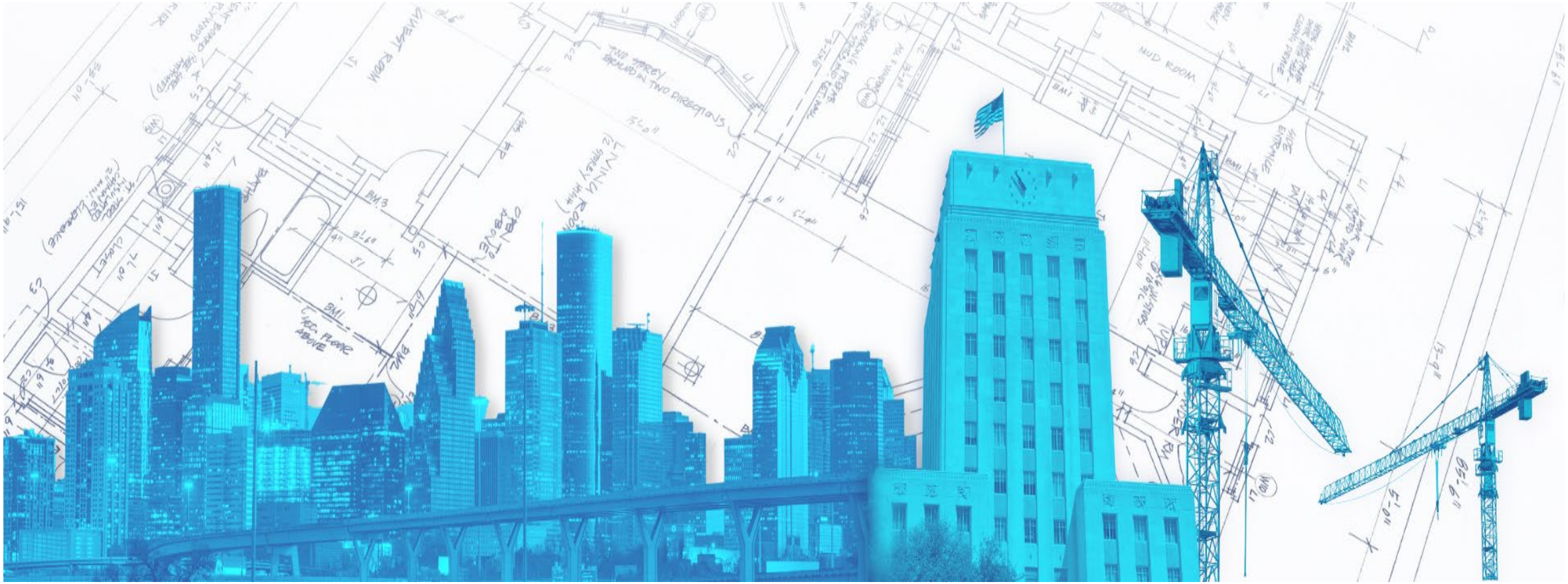
IFC CHAPTER 5 FIRE SERVICE FEATURES

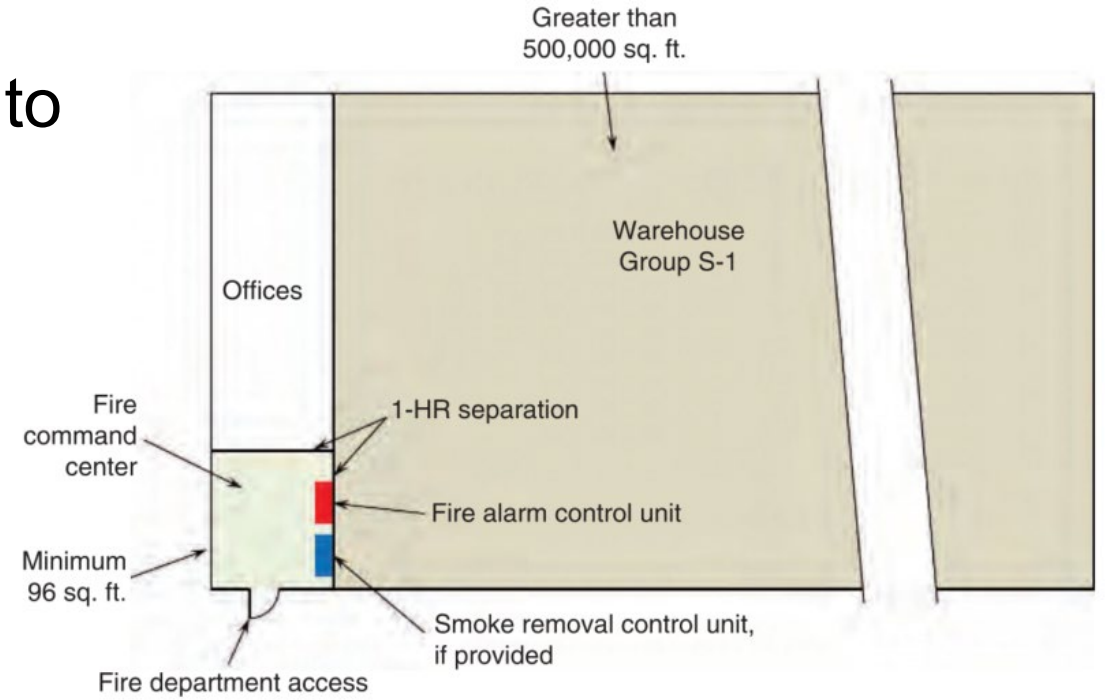


HOUSTON AMENDMENTS 507: FIRE PROTECTION WATER SUPPLIES

- New allowances where public water supply does not meet flow and pressure requirements for calculated fire flow
  - Alternative water supply now can be provided
- Fire code official authorized to require clearance for hose lay advancement access
  - Minimum unobstructed 5 feet by 10 feet clearance along perimeter of any building, structure or appurtenance
  - Allows adequate access and coverage during emergency operations for firefighters to deploy and advance fire hose lines

2021 IFC 508.1, 508.1.1, 508.1.3, 508.1.7: FIRE COMMAND CENTER

- A Fire Command Center now required in all F-1 and S-1 Occupancies over 500,000 square feet
  - Verbiage changed: requiring accessibility ➔ providing access to fire command center
  - Minimum size requirement of 96 square feet
  - Permanent easily visible identification sign



The fire command center is separated from the remainder of the building by 1-hour construction.

2018 IFC 510: EMERGENCY RESPONDER RADIO COVERAGE

- Revises requirements to address industry and equipment enhancements
  - Correlates to other sections
  - Now uses audibility scale to determine radio signal accuracy
  - Now allows both voice and data transmission systems
  - Specifies requirements for standby power supplies
  - Requires monitoring by alarm control unit

HOUSTON AMENDMENTS 510.4.1.1: EMERGENCY RESPONDER COMMUNICATION COVERAGE (ERCC)

- Specifies level of communication required
  - Required level of radio ➔ required level of in-building, two-way emergency responder communication

2021 IFC 510.4.1, 510.4.1.1, 202: EMERGENCY RESPONDER COMMUNICATION COVERAGE – SIGNALS

- Section 202: Defines critical areas
  - Areas designated for highest level of emergency responder radio coverage
- Section 510.4.1: Increases testing criteria for emergency responder communication coverage (ERCCS)
  - Specific phrasing: “In-building 2-way emergency responder communication coverage system”
  - Now requires acceptable signal strength coverage in 99% of critical areas
  - Inbound signal to be minimum of -95 dBm throughout coverage area

2021 IFC 510.4, 510.4.2.4, 510.4.2.5, 510.4.2.8, 510.5.1, 510.5.4: EMERGENCY RESPONDER COMMUNICATION COVERAGE – INTERFERENCE

- Addresses potential sources of radio interference to in-building 2-way ERCCS
  - All equipment to be listed in accordance with UL 2524
  - Signal boosters to have active RF emitting devices with built-in oscillation detection and control
  - Oscillation in active RF emitting devices to be monitored
  - Donor antennas to be permanently affixed or on movable sled where approved

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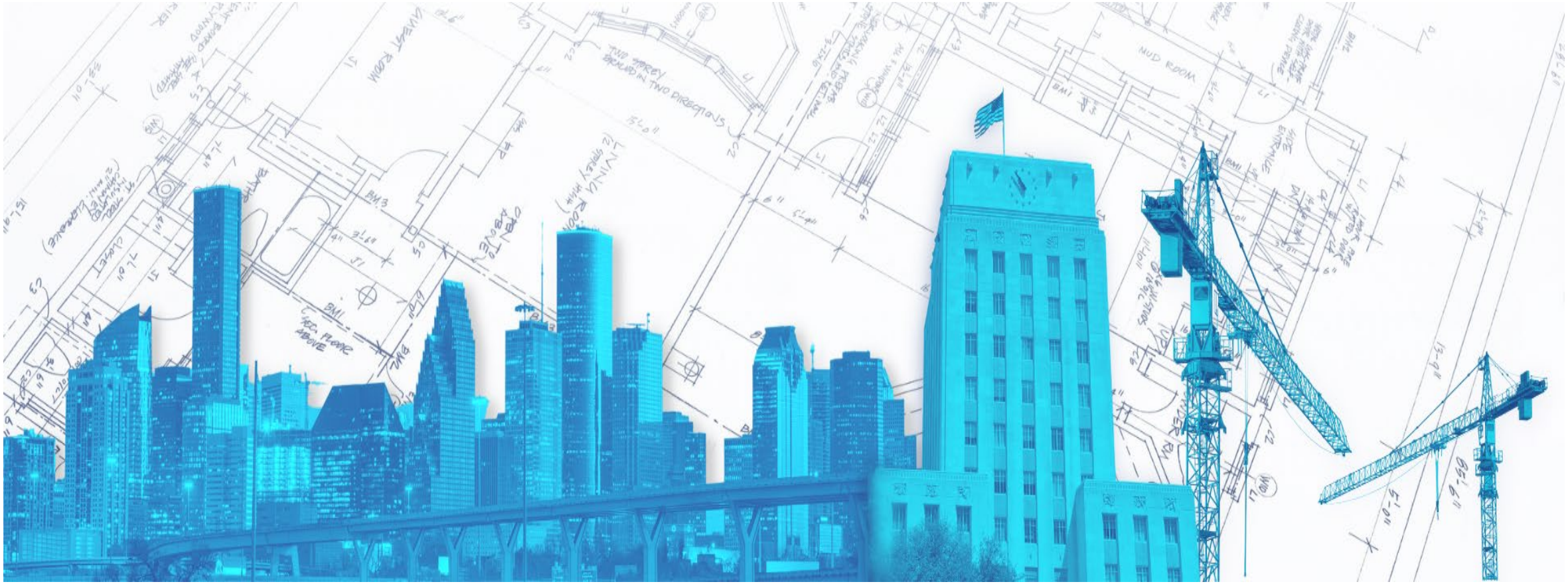
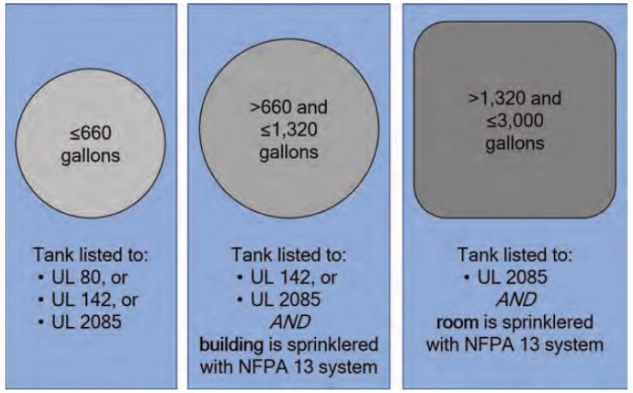
IFC CHAPTER 6 BUILDING SERVICES AND SYSTEMS



2018 IFC 603.1, 603.3: FUEL-FIRED APPLIANCES



- Clarifies applicability to internal combustion engines
  - Includes generators and fire pumps
- Fuel oil storage limit increased
  - 1,320 gallons if building sprinklered and tank listed to UL 142
- Rooms with fuel oil tanks for internal combustion engines to have 1 hour fire-resistance rating
  - Exception: Certain rooms with protected above-ground tanks
- Establishes where spill containment required
  - Tanks above 55 gallons or aggregate capacity of 1,000 gallons without integral secondary containment

TABLE 603-1 Maximum Capacity of Fuel Oil Based on Type of Tank and Automatic Sprinkler System Design

TANK DESIGN	NONSPRINKLERED BUILDING	FIRE SPRINKLERS PROVIDED IN THE ROOM	FIRE SPRINKLERS PROVIDED IN THE BUILDING
UL 80	660 gallons	660 gallons	660 gallons
UL 142	660 gallons	660 gallons	1,320 gallons
UL 2085	660 gallons	3,000 gallons	3,000 gallons

2021 IFC 603.4: ELECTRICAL WORKING SPACE

- Working space dimensions around electrical equipment now correlates with NFPA 70
  - Now references NFPA requirements including increased separation requirements

2021 IFC 604.5.4, 604.5.5, 315.3.3: STORAGE IN ELEVATOR MACHINE ROOMS AND LOBBIES

- Section 315.3.3: Combustible storage not permitted in elevator machine rooms
- Section 604.5: Where hoistway opening protection required, storage prohibited in elevator lobbies, elevator cars and elevator machine rooms
  - Exceptions:
    - Blankets for elevator cab wall protection during construction
    - Materials for operation and maintenance of elevators

Photo courtesy of raisbeckfoto/iStock / Getty Images Plus/ Getty Images

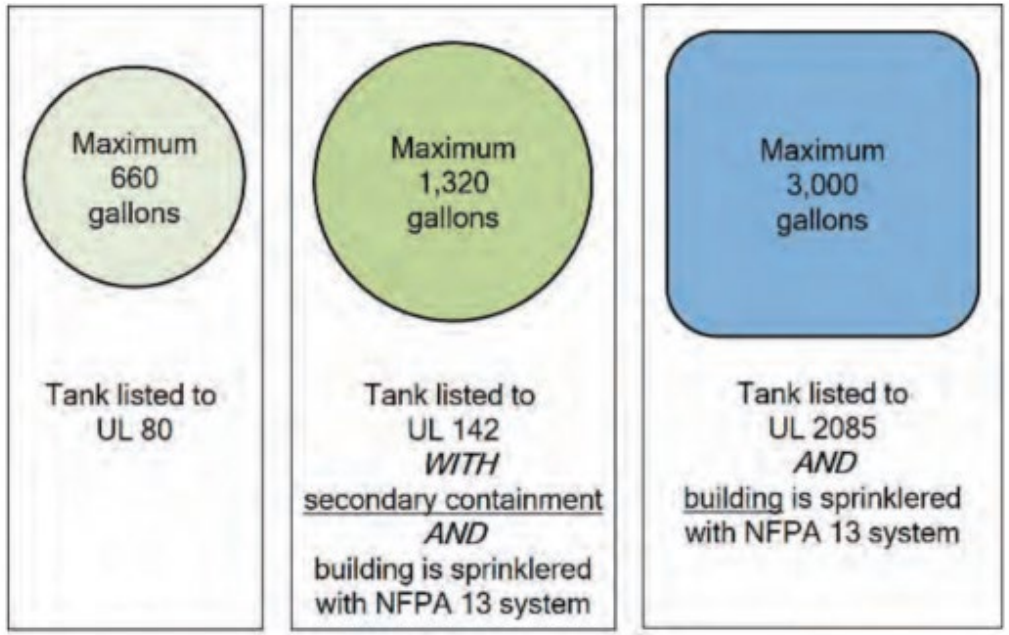
Storage is not allowed in elevator lobbies.

2018 IFC 605.13, 605.16, 605.17: REFRIGERANTS WITH LOWER FLAMMABILITY HAZARDS

- New Section 605.17: Special requirements for Group A2L refrigerant machinery rooms
  - Requires refrigeration detection system, emergency ventilation system, emergency ventilation system discharge

2021 IFC 605.1, 605.4, 605.4.1.1, 605.4.2.1, 605.4.2.2: FUEL OIL STORAGE TANKS

- Clarifies scope of Section 605
- Indoor and outdoor fuel-oil storage tanks to comply with standards UL 80, UL 142 or UL 2085
- Adds further requirements to tanks based on quantity limit



The capacity of the fuel-oil storage tank determines the level of protection required and the allowed listings for the tank.

2018 IFC 608.3: NONMETALLIC COOKING OIL STORAGE TANKS

- Adds listing requirements for cooking oil storage
  - Must be listed in accordance with UL 2152

Photo courtesy of Restaurant Technologies, Inc.

Typically, two tanks are installed for cooking oil storage; one for fresh oil, and one for waste oil.

2021 IFC 610: CLOTHES DRYER EXHAUST DUCTS

- New Section 610: Clothes Dryer Exhaust Systems
  - Vent ducts to comply with International Mechanical Code or International Fuel Gas Code
  - Lint trap to be maintained with manufacturer's operating installation instructions

Photo courtesy of JodiJacobson/iStock / Getty Images Plus/Getty Images

The build-up of lint and debris in dryer exhaust ducts causes overheating and presents a fire problem.

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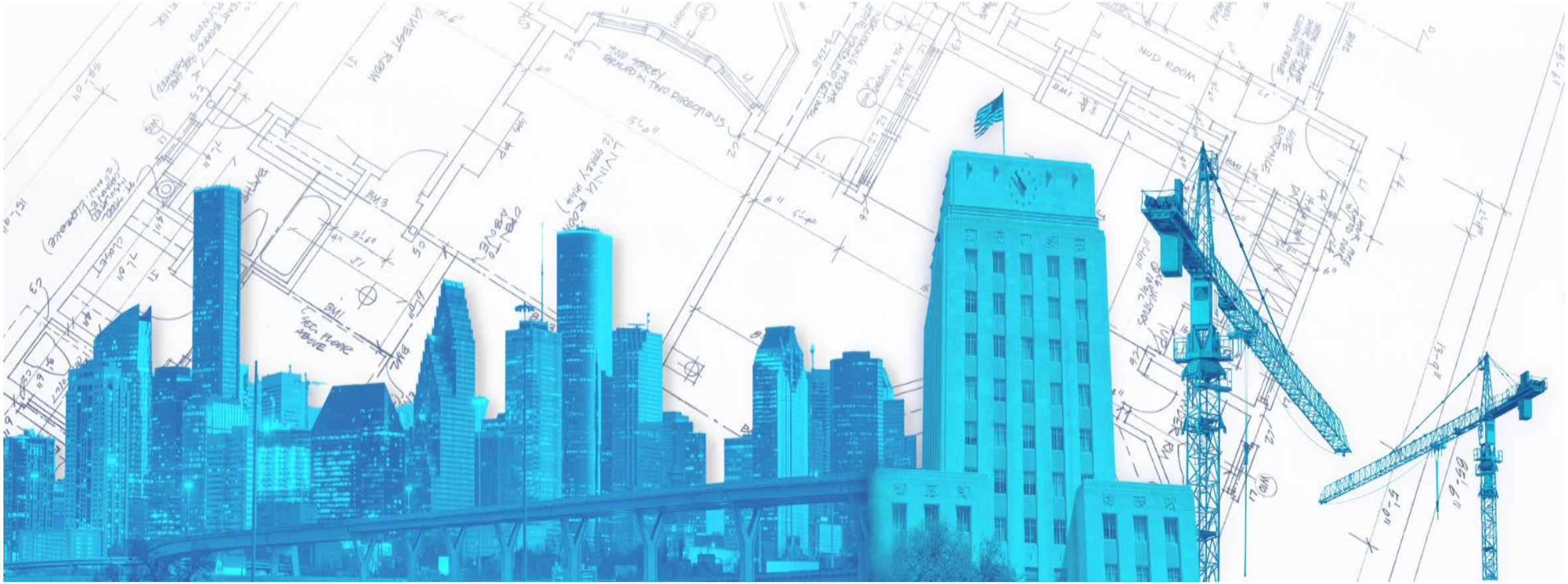
IFC CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES



2021 IFC 701.6: MAINTENANCE OF FIRE-RESISTANCE-RATED CONSTRUCTION

- Owner inspections required annually for fire-resistance-rated protection of mass timber construction
  - New references to 602.4.1 and 602.4.2 of the International Building Code

Photo courtesy of American Wood Council

Type IVA construction requires mass timber to have noncombustible protection.

2021 IFC 703.2, 704.2: REPAIR OF PENETRATIONS AND VOIDS

- New requirements specifying repair or replacement for penetrations, joints and voids in fire-resistance-rated construction
  - Must use materials that meet or exceed the code requirements applicable at the time

The through penetrations are sealed and must be properly maintained throughout the life of the building.

2021 IFC 708, 708.1: MAINTENANCE OF SPRAY FIRE-RESISTANT MATERIALS

- Adds maintenance requirements of spray fire-resistant materials and intumescent fire-resistant materials
  - Must be visually inspected to verify materials are not exposed to substrate

The spray fire-resistant material on this column has been damaged. The steel underneath is exposed and portions have been compressed.

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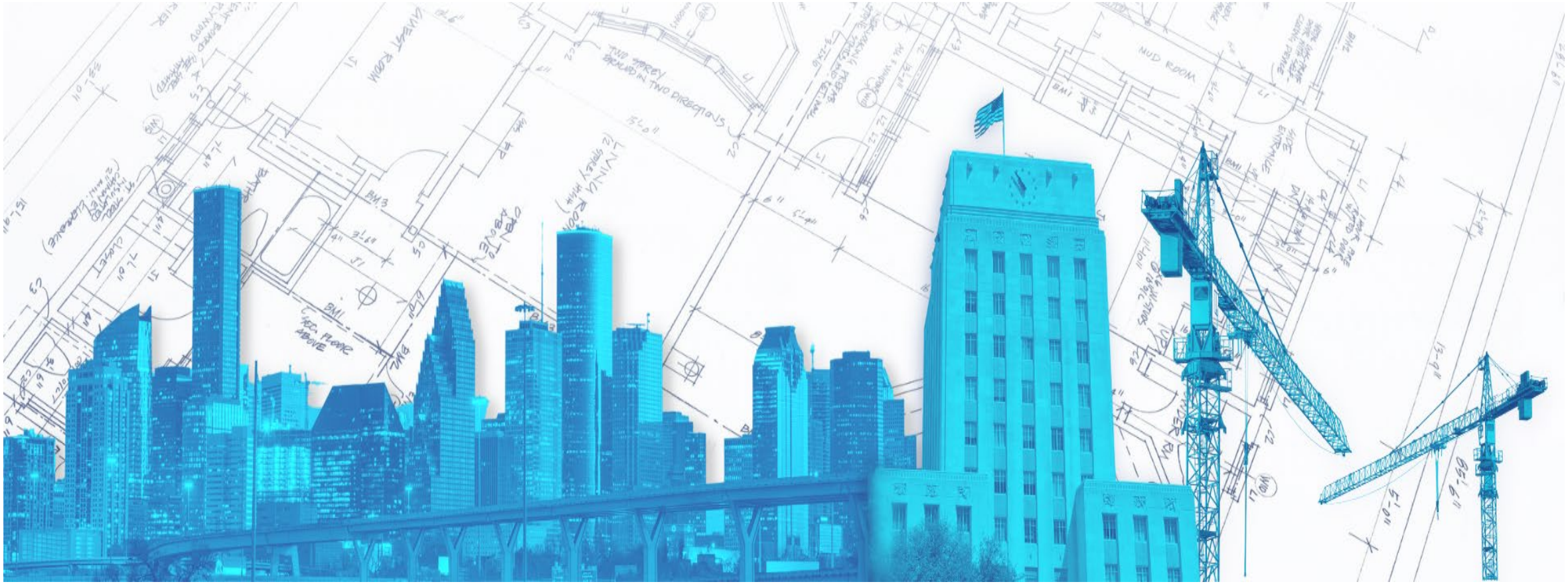
IFC CHAPTER 8 INTERIOR FINISH, DECORATIVE MATERIALS AND FURNISHINGS



2018 IFC 807.1, 807.2, 807.5: COMBUSTIBLE DECORATIVE MATERIALS

- Clarifies the scope of the section
- Decorative vegetation is no longer excluded as combustible decorative materials
- Revises requirements limiting curtains to not 10 percent of the specific wall or ceiling area where they are attached
  - Specifies Groups A, B, E, I, M and R-1 and dormitories in Group R-2
  - New exception: Does not apply to curtains used as window coverings

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While the tree and glass globes are noncombustible decorative materials, the fabric draped across the ceiling is a combustible decoration and is limited to 10 percent of the ceiling area.

2018 IFC 807.4: ARTIFICIAL DECORATIVE VEGETATION

- Testing of decorative artificial vegetation not required in certain Group I and Group R occupancies with automatic sprinkler systems given:
  - Items on doors do not obstruct door operation and do not cover more than 50% of door surface area
  - Vegetation is 30% or less of the wall area
  - Vegetation not on doors or walls does not exceed 3 feet in any dimension
- New restrictions on electrical wiring and lighting
  - Unlisted wiring or lights on artificial decorative vegetation prohibited
  - Wiring on artificial trees constructed entirely of metal prohibited

2021 IFC 808.5: PLAY STRUCTURES

- New Section 808.5: Play structures added to existing buildings
  - Play structures above 10 feet in height or 150 square feet in area must comply with Section 424 of the International Building Code

Photo courtesy of scaliger/iStock / Getty Images Plus/ Getty Images

Play structures contain large volumes of combustible materials and plastics.

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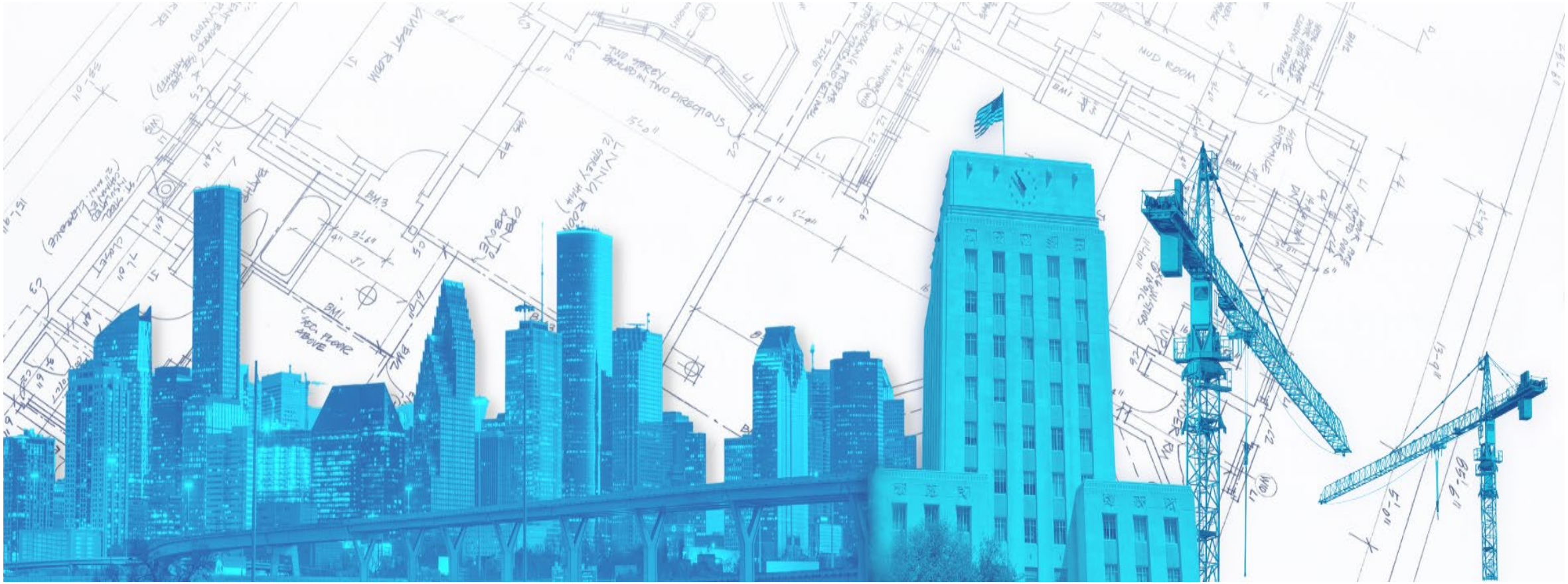
IFC CHAPTER 9 FIRE PROTECTION AND LIFE SAFETY SYSTEMS



2018 IFC 901.4.6.1, 901.4.6.2, 901.4.6.3, 901.4.6.4: FIRE PUMP AND FIRE SPRINKLER RISER ROOMS

- Automatic sprinkler system risers, fire pumps, and controllers to be provided with ready access
  - If located in the fire pump room or automatic sprinkler system riser room, the door is permitted to be locked, provided a key is available at all times
- New requirements for automatic sprinkler system riser rooms and fire pump rooms
  - Labeled with an approved sign
  - Maintained at a minimum of 40°F
  - Permanent lighting

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Fire sprinkler riser room is identified and a lock box is provided to allow fire department access.

2021 IFC 901.1, 901.2, 901.2.1, 901.4, 901.4.1, 901.4.2, 901.4.3, 901.4.5, 901.6, 202: LIFE SAFETY SYSTEMS

- Section 202: Defines life safety systems
  - Systems, devices, and equipment that enhance or facilitate evacuation, smoke control, compartmentation, or isolation
- Section 901: Changes in text addressing protection systems
  - Fire protection systems ➔ fire protection and/or life safety systems

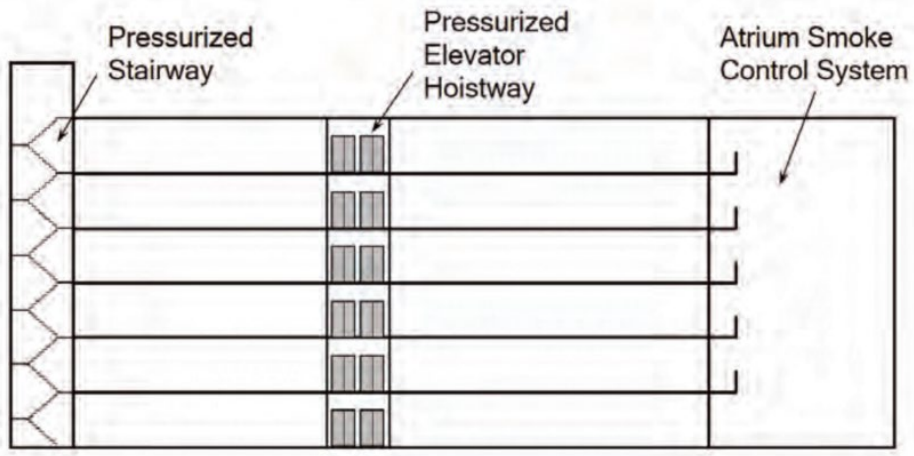
This carbon dioxide detector would be considered a life safety system.

HOUSTON AMENDMENTS 901.13 FIRE PUMPS

- Section removed on fire pumps:
  - Removes requirements for listings by Factory Mutual, Underwriters Laboratories or another approved agency
  - Removes requirements for fire flow and pressure in accordance with the listing and automatic operation
  - Removes requirements for pump supply source to be a break tank served from the city main
    - Previously, pump was to be sized as required by NFPA 20, or minimum 2500 gallons, whichever is more restrictive

2018 IFC 901.6.2, 202: INTEGRATED FIRE PROTECTION SYSTEM TESTING

- Section 202: Defines fire protection and life safety system terminology
  - Integrated testing
  - Subordinate
- New Section 901.6.2: Testing criteria for integrated fire protection or life safety systems
  - Subordinate responses to be verified during system testing
  - High-rise buildings and buildings with smoke control systems requiring integrated testing to comply with NFPA 4



Smoke detectors in the elevator lobbies are connected to the elevator controls. Smoke detection in the atrium activates the smoke control system and closes the fire doors separating the atrium from the remainder of the building. The ventilation system for pressurized stairways and pressurized hoistways is activated by smoke detection, fire alarm, or waterflow on the sprinkler system. These various systems must be integrated to function together properly.

2018 IFC 901.8.2: REMOVAL OF OCCUPANT-USE HOSE LINES

- Code officials can allow the removal of occupant-use hose lines regardless of code requirements where both of the following conditions are met:
  - Hose line would not be utilized by trained personnel or fire department
  - Remaining outlets are compatible with local fire department fittings

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This hose cabinet previously contained hose and nozzle for occupant use. These items have been removed and the remaining connection is compatible with the fire department hose fittings.

2018 IFC 903.2.1: SPRINKLERS IN GROUP A OCCUPANCIES

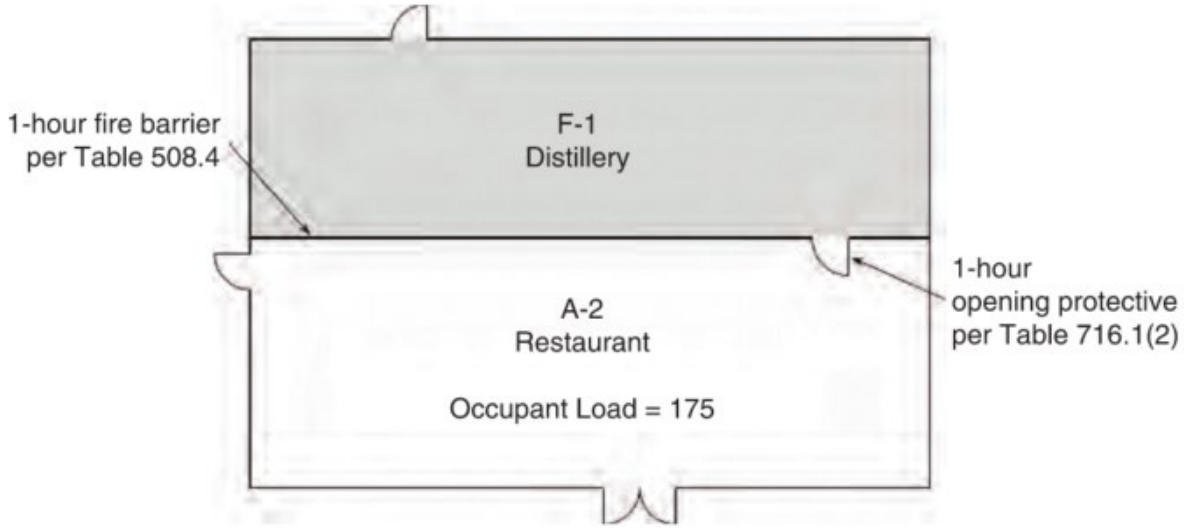
- Clarifies requirements for fire sprinkler protection in Group A occupancies
  - Under certain conditions, automatic sprinkler system required for fire areas of Group A ➔ required throughout stories containing Group A occupancies under certain conditions
- Enclosed spaces under grandstands or bleachers require automatic sprinkler systems given either:
  - Enclosed area less than 1,000 square feet and not constructed in accordance with Section 1029.1.1.1
  - Enclosed area exceeds 1,000 square feet

2018 IFC 903.2.3: SPRINKLERS IN GROUP E OCCUPANCIES

- Automatic sprinkler system now required in Group E where:
  - Fire area is located on floor other than exit discharge (see full section for exception)
  - Fire area has an occupant load over 300

2021 IFC 903.2.4.2, 903.2.9.3: DISTILLED SPIRITS

- Automatic sprinkler systems now required in Group F-1 and Group S-1 fire areas involving distilled spirits or wine
- No minimum threshold value
  - Any fire area with bulk storage or manufacturing requires sprinklers



This restaurant and attached distillery are constructed as a separated mixed occupancy and require a 1-hour fire barrier separating the Group A-2 from the Group F-1 when the entire building is sprinklered.

2021 IFC 903.2.4, 903.2.4.3, 903.2.7, 903.2.7.2, 903.2.9, 903.2.9.4: UPHOLSTERED FURNITURE AND MATTRESSES

- Clarifies code: automatic sprinkler systems required in Group F-1, Group M, and Group S-1 fire areas involving upholstered furniture and mattresses
  - New exception: Not required in Group S-1 single story self-service storage facilities with all storage spaces accessible from exterior

This self-service storage facility would not require fire sprinklers because it is only one story and all units can be accessed from the exterior.

2021 IFC 903.2.10, 903.2.11.3: GROUP S-2 PARKING GARAGES

- Automatic sprinkler systems now required for open parking garages over 48,000 square feet
  - Enclosed garage threshold 12,000 square feet in comparison
- Open parking structures 55+ feet tall no longer have sprinkler exception

New construction of an open parking garage with a fire area exceeding 48,000 square feet is required to install an automatic sprinkler system.

2021 IFC 903.2.10.2, IBC 202: MECHANICAL-ACCESS PARKING GARAGES

- IBC Section 202: Defines mechanical-access enclosed parking garages
- Section 903.2.10.2: Requires mechanical-access enclosed parking garages to have an automatic sprinkler system

Photo courtesy of Paul Armstrong, Paul Armstrong Code Consulting Services

Vehicles are moved automatically to one of various levels of parking spaces in this mechanical-access parking garage.

2018 IFC 903.3.1.1.2: SPRINKLERS IN BATHROOMS IN GROUP R OCCUPANCIES

- Fire sprinkler requirements no longer apply specifically to small bathrooms in Group R-4 occupancies

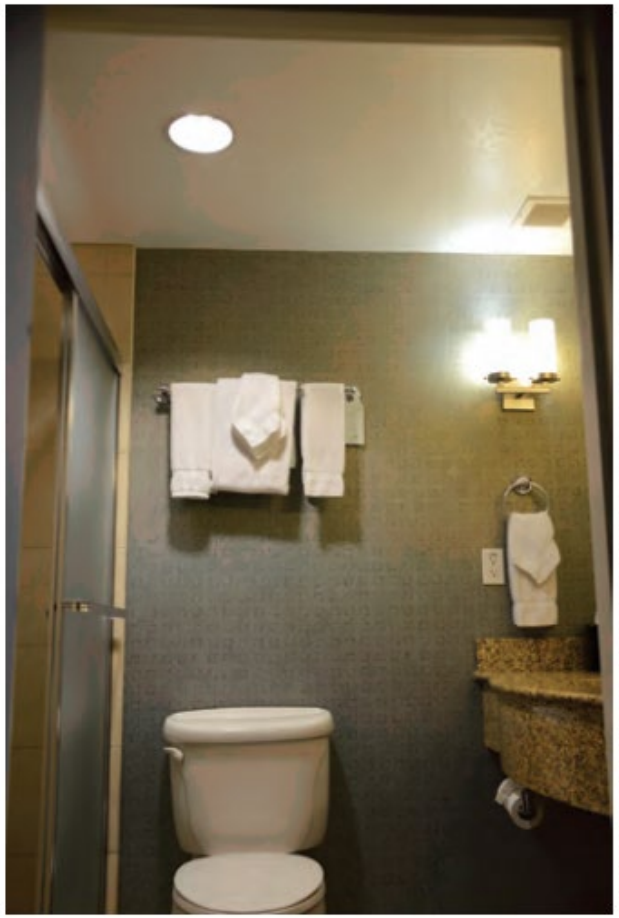


Photo courtesy of Assistant Fire Marshal Fulton Cochran, Clark County Building and Fire Prevention Services

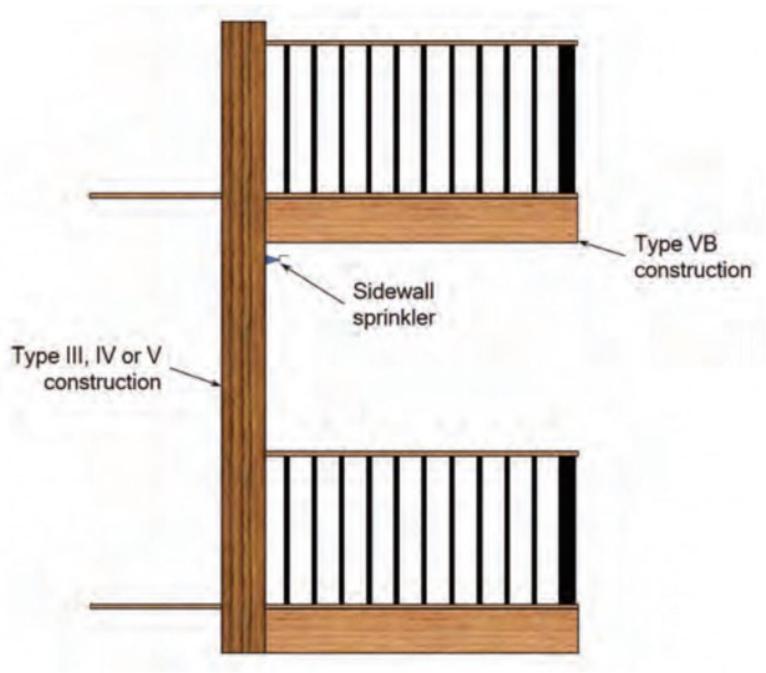
Small bathrooms in Group R-4 occupancies do not need to be protected with fire sprinklers.

2021 IFC 903.3.1.2: NFPA 13R SPRINKLER SYSTEMS

- Reduces allowable use of NFPA 13R sprinklers in Group R occupancies
- NFPA 13R sprinklers permitted where all conditions are met:
  - 2018 IFC ➔ 2021 IFC
  - No restriction ➔ Four stories or less
  - Highest story floor 60 feet or less ➔ 30 feet or less above fire department vehicle access
  - Lowest story floor 60 feet or less ➔ 30 feet or less below fire department vehicle access
- Number of stories in Group R occupancies:
  - Measured from horizontal assembly separating buildings ➔ measured from grade plane

2018 IFC 903.3.1.2.1: SPRINKLERS BENEATH BALCONIES

- Sprinkler protection required for exterior balconies, decks, and ground floor patios of dwelling and sleeping units given either condition:
  - Building is Type V, provided if a roof or deck above
  - New condition: Areas are constructed in accordance with Section 705.2.3.1, Exception 3



In buildings of Type III, IV or V construction, the exterior balcony can be Type V construction with no fire-resistance-rating if sprinklers are installed to protect the balcony.

2021 IFC 903.3.1.2.2: SPRINKLERS ON MEANS OF EGRESS BALCONIES

- Sprinklers now required for corridors and balconies with:
  - Combustible floor/walls
  - Interior change of direction 45+ degrees
  - Less than 50% open to outside at ends
  - Open-ended corridors, stairways, ramps in 1027.6, Exception 3
  - Egress balconies not complying with 1021.2 and 1021.3

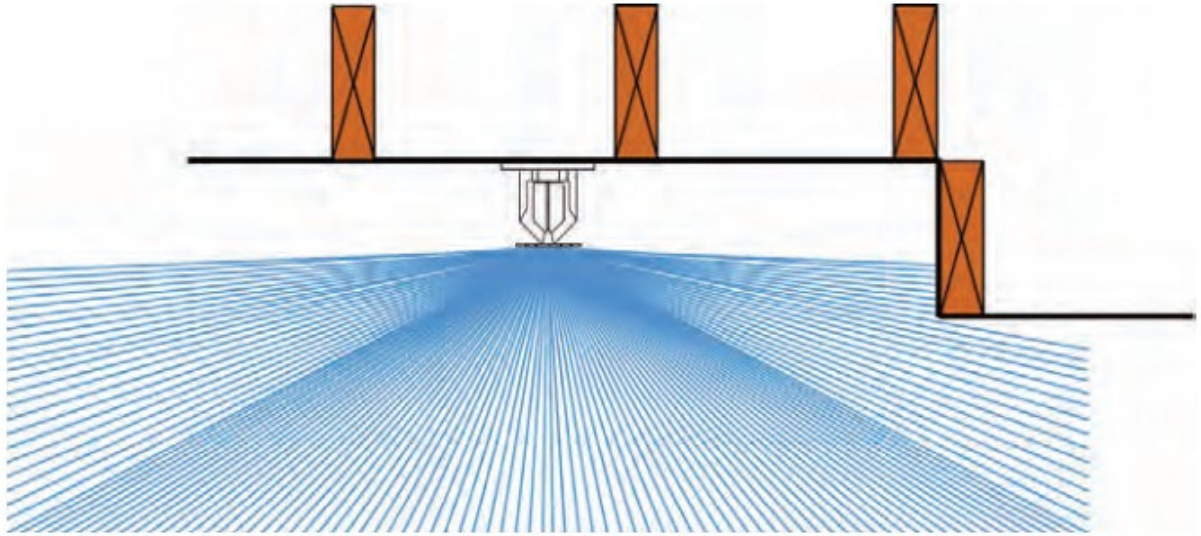
This egress balcony is at least 50 percent open to the exterior and would not be required to be provided with sprinklers even though the building is sprinklered.

2018 IFC 903.3.1.2.3: PROTECTION OF ATTICS IN GROUP R OCCUPANCIES

- New Section 903.3.1.2.3: Attics
  - Automatic sprinkler system required in attics intended for living spaces or storage
  - Quick-response intermediate temperature sprinklers are required where fuel-fired equipment installed in unsprinklered attics
  - Requirements for certain Type III, Type IV, or Type V construction attics
    - Applies to attics with roof assembly 55 feet above lowest level of required fire department vehicle access
    - Several options to protect attic space
  - Requirements for certain Group R-4, Condition 2 occupancy attics
    - Several options to protect attic space

2018 IFC 903.3.3: SPRINKLER OBSTRUCTIONS

- Now directs to sprinkler design standard to address sprinkler obstruction
  - Automatic sprinklers to be in accordance with applicable automatic sprinkler system standard that is being used



Fire sprinklers must be installed to either avoid obstructions, or adjusted so that the obstructions do not negatively impact the spray pattern.

2018 IFC 904.12: COMMERCIAL COOKING OPERATIONS:

- New code references for installation of fire-extinguishing systems as protection for commercial cooking operations
  - Installation must comply with NFPA 96
- Commercial cooking systems now permitted to be protected with a water mist fire-extinguishing system
  - Must be installed in accordance with NFPA 750

Photo courtesy of CaptiveAire

These cooking appliances are protected with an automatic water mist system.

2018 IFC 904.13: DOMESTIC COOKING IN INSTITUTIONAL OCCUPANCIES

- Requires automatic fire-extinguishing system to protect domestic cooking appliances in care facilities (Group I-1, Group I-2 Condition 1, and Group R-2 college dorms)
  - Must be a type specifically for protection of domestic cooking equipment
  - Manual actuation required
  - Interconnection of fuel and electric power supply required

Photo courtesy of Denlar Fire Protection

This domestic cooking appliance is protected with a UL 300A fire-extinguishing system.

2018 IFC 904.14, TABLE 901.6.1: AEROSOL FIRE-EXTINGUISHING SYSTEMS

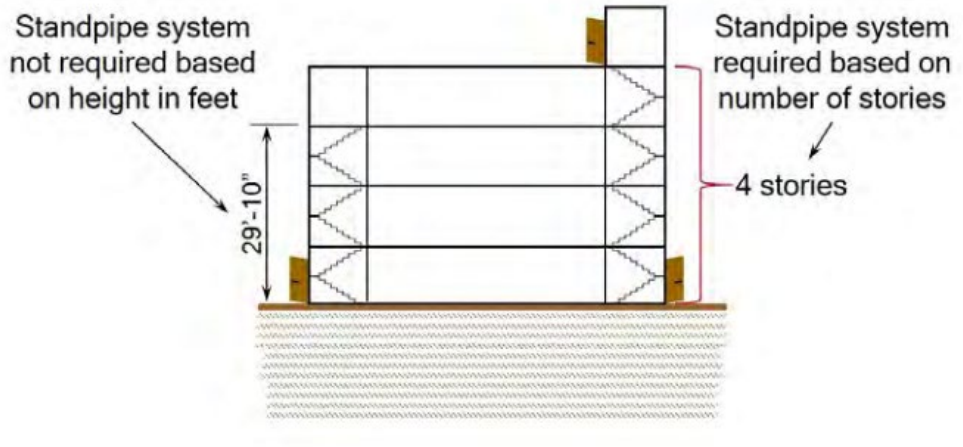
- New Section 904.14: Aerosol fire-extinguishing systems
  - Requirements for installation, inspections, testing and maintenance
  - Maintenance to be semiannual and to follow NFPA 2010

Photo courtesy of Fireaway Inc.

This is an aerosol fire-extinguishing device that is electrically operated.

2018 IFC 905.3.1: CLASS III STANDPIPES

- Class III standpipes are now required where there are 4+ stories above or below grade plane
- New exceptions to Class III requirements
  - Class I standpipes allowed in Group B and E occupancies
  - Class I standpipes allowed in buildings where occupant-use hose lines will not be utilized by trained personnel or the fire department



Even though the highest floor level is less than 30 feet above fire department vehicle access, the building requires a standpipe system because it is four stories or more.

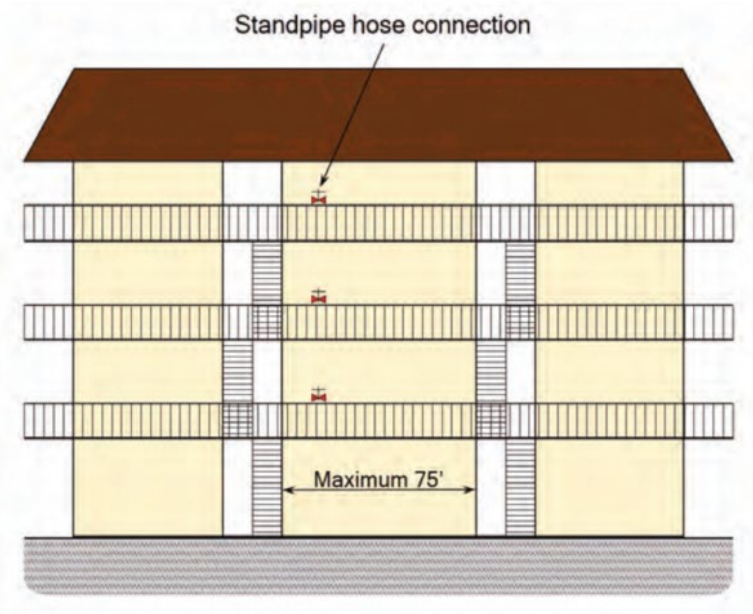
2021 IFC 905.3.1: STANDPIPES IN PARKING GARAGES

- Class I standpipes now allowed in all parking garages
- Class I manual dry standpipes no longer allowed in open parking garages subject to freezing temperatures

Class I standpipe connection in a parking garage.

2018 IFC 905.4: CLASS I STANDPIPE HOSE CONNECTIONS

- Modification regarding hose connection locations for Class I standpipes serving open stairways
  - Hose connections to be located at the main floor landing rather than intermediate landings
  - New exception: A single hose connection permitted in an open corridor or breezeway between open stairs that are not greater than 75 feet apart



A single hose connection can be installed between open stairways connected by open breezeways provided the stairways are no further than 75 feet apart.

2018 IFC 905.11: LOCKING CAPS ON STANDPIPE OUTLETS

- Authorizes the code official to require locking caps on dry standpipe hose connection outlets

2018 IFC 906.1: PORTABLE FIRE EXTINGUISHERS

- Modification to portable fire extinguisher location requirements
  - New exception: Group E occupancies required only in specified locations
    - Requires each classroom to have a portable fire extinguisher with minimum rating 2-A:20-B:C
  - New requirement: Required within 30 feet distance of travel from commercial and domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies

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Where each classroom in a Group E occupancy is provided with a fire extinguisher, additional fire extinguishers in the corridors are not required.

2021 IFC 906.1: PORTABLE FIRE EXTINGUISHERS

- Allows vehicle-mounted extinguishers in place of fixed fire extinguishers in Group S storage given the following:
  - Forklift/other powered cart operators are the primary occupants
  - Vehicle-mounted extinguishers approved by the fire code official
  - Maintenance and inspection is done
- Portable fire extinguishers are not required in unoccupied Group U communication equipment structures.

Photo courtesy of Marc Dufresne/iStock / Getty Images Plus/Getty Images

This forklift is equipped with a portable fire extinguisher within reach of the operator.

2018 IFC 907.1.2: FIRE ALARM CONSTRUCTION DOCUMENTS

- Aligns requirements for fire alarm plans and documentation with NFPA
  - Removes prescriptive list of required items and now refers to NFPA 72

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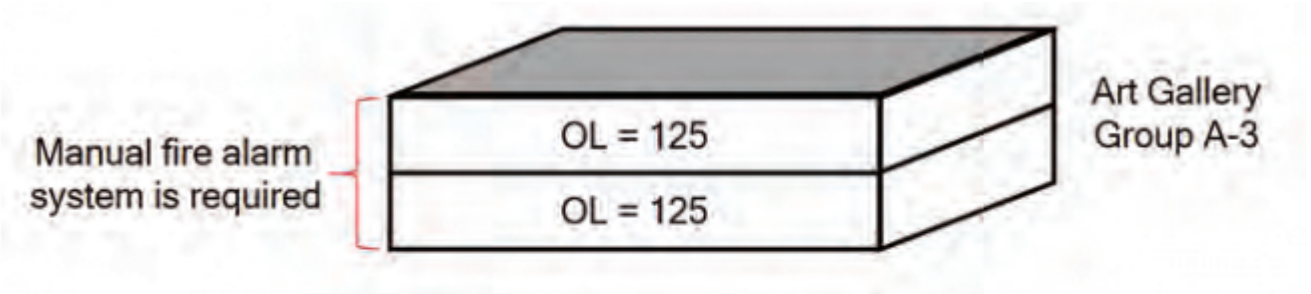
The fire alarm control unit controls the fire alarm system and its location must be shown on the construction documents.

2018 IFC 907.2.1: FIRE ALARMS IN GROUP A OCCUPANCIES

- New threshold for manual fire alarm systems in Group A occupancies
  - Where 100+ occupant load located on a level other than exit discharge



A fire alarm system is not required in Group A-3 with an aggregate occupant load of 250, but since the occupant load on the second floor exceeds 100, a fire alarm system is required.

2018 IFC 907.2.10: GROUP R-4 FIRE ALARM SYSTEM (DELETED)

- Fire alarm systems no longer required in Group R-4 occupancies
  - All requirements removed from code

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The requirement for a fire alarm system in Group R-4 occupancies has been deleted.

2021 IFC 907.2.10: MANUAL FIRE ALARM IN PUBLIC-STORAGE AND SELF-STORAGE FACILITIES

- Manual fire alarm system that activates occupant notification system now required in 3+ story Group S self-storage facilities with interior corridors and common areas
  - Exception: Not required if sprinklered and notification activates upon water flow

This four-story self-storage facility will require a manual fire alarm system.

2021 IFC 907.4, 907.5, 907.5.1, 907.5.2.1.3, 907.5.2.1.3.1, 907.5.2.1.3.2: LOW-FREQUENCY ALARMS IN SLEEPING ROOMS

- Low-frequency audible alarm requirements now in R-1 and R-2 occupancies
  - Fire alarm and smoke alarm signal to be 520 Hz in sleeping rooms
  - If alarms cannot produce a 520 Hz signal, a notification device with 520 Hz should be provided

Photo courtesy of Daniel P. Finnegan, Siemens Industry, Inc., Florham Park, NJ

This smoke detector is equipped with an optional sounder base to produce the 520 Hz low-frequency alarm signal.

2021 IFC 907.5.2.1.2: SOUND PRESSURE LEVEL FOR AUDIBLE ALARMS

- Calculation for total sound pressure level now to include the ambient sound pressure level
  - Visual instead of audible appliances to be provided where the level exceeds 95 dBA ➔ 105 dBA

The total sound pressure level cannot exceed 110 dBA when all notification appliances are operating.

2018 IFC 907.5.2.2.4: EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM CAPTIONS

- Requirements for stadiums, arenas and grandstands where stadiums have 15,000+ fixed seats and provide audible public announcements
  - Requires emergency voice/alarm communication system to have pre-recorded or real-time captions

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This venue, with over 15,000 fixed seats, requires captioned announcements from the emergency voice/alarm communications system.

2021 IFC 907.5.2.2.5, 1203.2.4: STANDBY POWER FOR EMERGENCY VOICE/ALARM COMMUNICATIONS SYSTEMS

- Emergency voice/alarm systems to be provided with emergency power ➔ standby power supply
  - No longer requiring capability of 24 hours for power load

Standby generators can be used to power the emergency voice/alarm communication system.

2021 IFC 907.5.2.3.3, 907.5.2.3.3.1: EXPANSION CAPABILITY FOR FIRE ALARMS IN GROUP R-2

- Clarifies three options for fire alarms in Group R-2 to allow future visible notification appliances.
- Wired equipment to include one capability:
  - Replacement of audible appliances with combination audible/visible appliances or additional visible appliances.
  - Extension of existing wiring from smoke alarm locations to required locations for future visible appliances.
  - Fire alarm power supply and circuits minimum 5-percent excess capacity to accommodate future visible alarm appliances, with a single access point to such circuits available on every story.
    - Not required to be extended beyond a single access point on a story.

2021 IFC 907.6.6.1, 907.6.6.2: FIRE ALARM SYSTEM MONITORING

- Human interface is required prior to transmittal to emergency dispatch.
  - Automatic telephones in emergency alarm not to be connected to fire department numbers ➔ All alarm signals to a supervising station shall be in accordance with NFPA 72.
  - Monitor it Yourself alarms transmitting directly to a public safety answering point are not permitted unless approved

The Monitor it Yourself (MIY) system is capable of sending alarm signals directly to a cell phone.

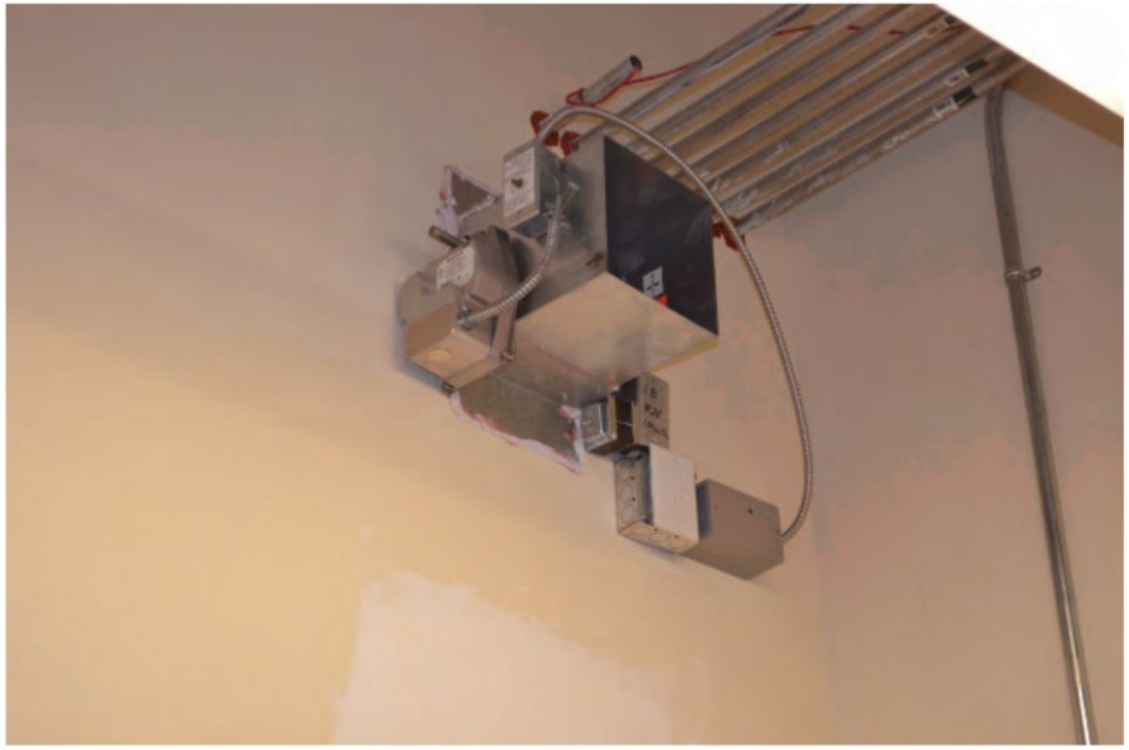
2021 IFC 908.3: EMERGENCY ALARM AND FIRE ALARM INTERFACE

- Where an emergency alarm system is interfaced with a building's fire alarm system, the signal at the fire alarm control unit to be a supervisory signal

Activation of the emergency alarm will result in a supervisory signal at the fire alarm control unit.

2021 IFC 909.17: SMOKE CONTROL SYSTEM RESPONSE TIME

- Smoke control system now has maximum allowed response time
  - Upon receipt of an alarm condition at the fire alarm control panel, fans, dampers, and automatic doors shall have achieved their proper operating state and the final status shall be indicated at the smoke control panel within **90 seconds**.



Within 90 seconds of receipt of an alarm at the fire alarm control unit, this motorized fire damper must be in the appropriate position for smoke control system operation.

2021 IFC 910.3.4, 910.3.5: SMOKE AND HEAT VENT OPERATION

- Smoke and heat vents to be capable of being operated by both approved automatic and manual means
- Areas with automatic fire sprinklers and vents that operate by fusible link: the fusible link to have a temperature rating of 360 °F

Photo courtesy of Bilco, Inc.

Smoke and heat vents must be capable of manual operation in addition to the automatic operation.

2018 IFC 910.5: MAINTENANCE OF SMOKE AND HEAT REMOVAL EQUIPMENT

- Specifies inspection, testing and maintenance frequencies for certain smoke and heat vents and mechanical smoke removal
  - Mechanically operated smoke and heat vents to be inspected annually and operationally tested every 5 years
  - Gravity dropout smoke and heat vents to be inspected annually
  - Fused, damaged or painted fusible links to be replaced
  - Mechanical smoke removal systems to be inspected and operationally tested annually and include the operation of all system components, controls and ancillary equipment

HOUSTON AMENDMENTS 913.6 FIRE PUMP MINIMUM SUCTION PRESSURE

- Fire pumps taking direct suction from city water to be designed so city water pressure does not drop to less than 20 psi
  - Value to be taken at 150% of rated capacity of selected pump
- Where public water supply does not meet minimum suction pressure requirements an alternative water supply to be provided in accordance with Section 507.2
  - Tank size cannot be less than the full fire protection demand without refill rate included unless it meets break tank requirements (NFPA 22)

2021 IFC 913.1: FIRE PUMPS

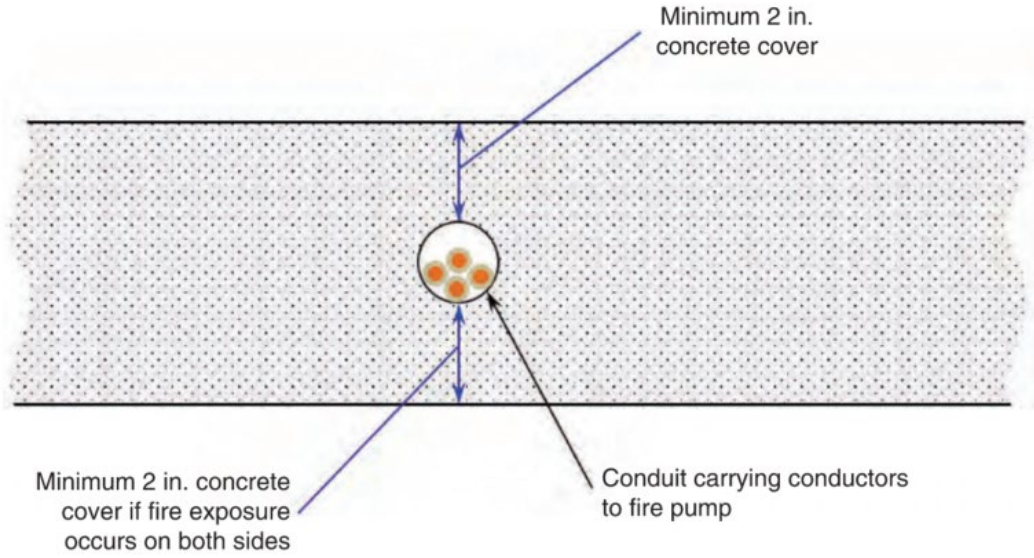
- Clarification: Fire pumps **for fire protection systems** to be installed in accordance with Chapter 9 and NFPA 20
  - New exception for sprinkler pumps installed in accordance with Section 903.3.1.3 or Section P2904 of the International Residential Code

Photo courtesy of Panupong Piewkleng/iStock / Getty Images Plus/Getty Images

This fire pump serving the fire sprinkler system and standpipe system is required to comply with NFPA 20.

2021 IFC 913.2.2: PROTECTION OF CIRCUITS FOR ELECTRIC FIRE PUMPS

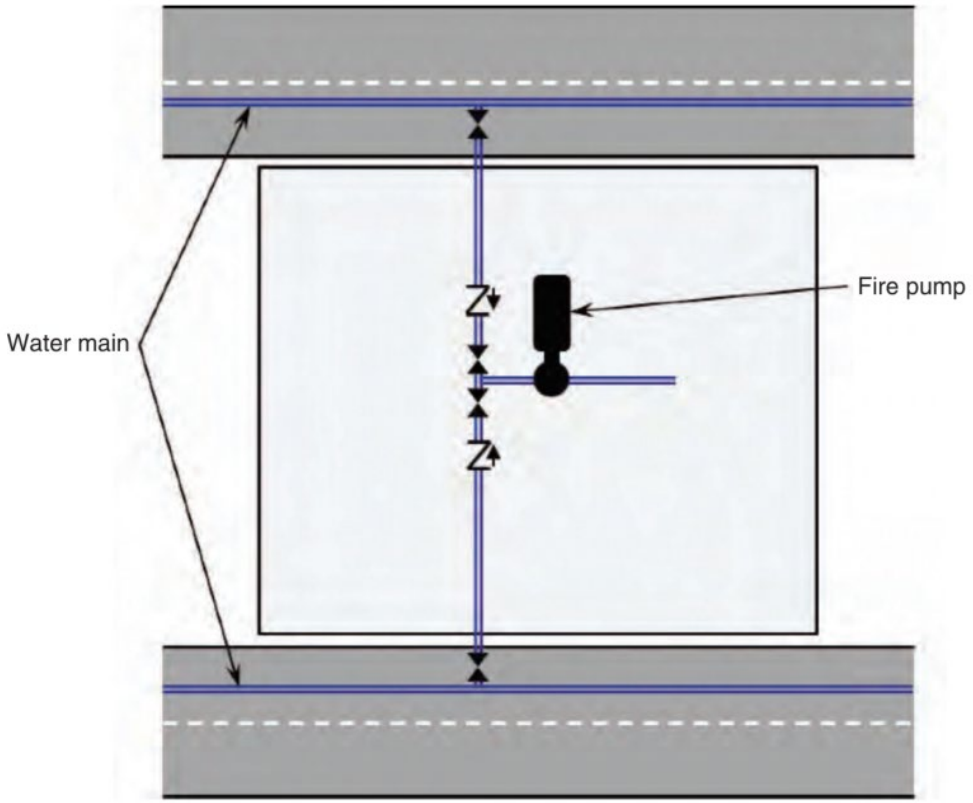
- Encasing cable/raceway in minimum 2 inches of concrete a permitted method of protecting cables used for survivability of circuits supplying fire pumps
  - Does not apply to cables within a fire pump or generator room separated from building with fire-resistance-rated construction



A minimum of 2 inches of concrete will provide fire protection for the power supply for electric motor-driven fire pumps.

2021 IFC 914.3.1.2: WATER SUPPLY TO FIRE PUMPS

- Redundant water supply required for Type IVA and IVB buildings 120+ feet tall
- Fire pumps require supply by at least two water main connections located in different streets
  - Exception: Two connections to the same main are permitted, given the main is valved so the water supply can continue if a connection is lost



Connection to two water mains, each in a different street, is required for water supply to the fire pump in specified high-rise buildings.

2021 IFC 914.7, 914.7.1, 914.7.2, 202: PUZZLE ROOMS

- Section 202:
  - Defines puzzle room (escape rooms) as a type of special amusement area
  - Text changes: Special amusement buildings ➔ special amusement areas
- Chapter 9:
  - Text changes: Special amusement buildings ➔ special amusement areas

Photo courtesy of JackF/iStock / Getty Images Plus/Getty Images

Puzzle rooms, or escape rooms, are now treated as special amusement areas.

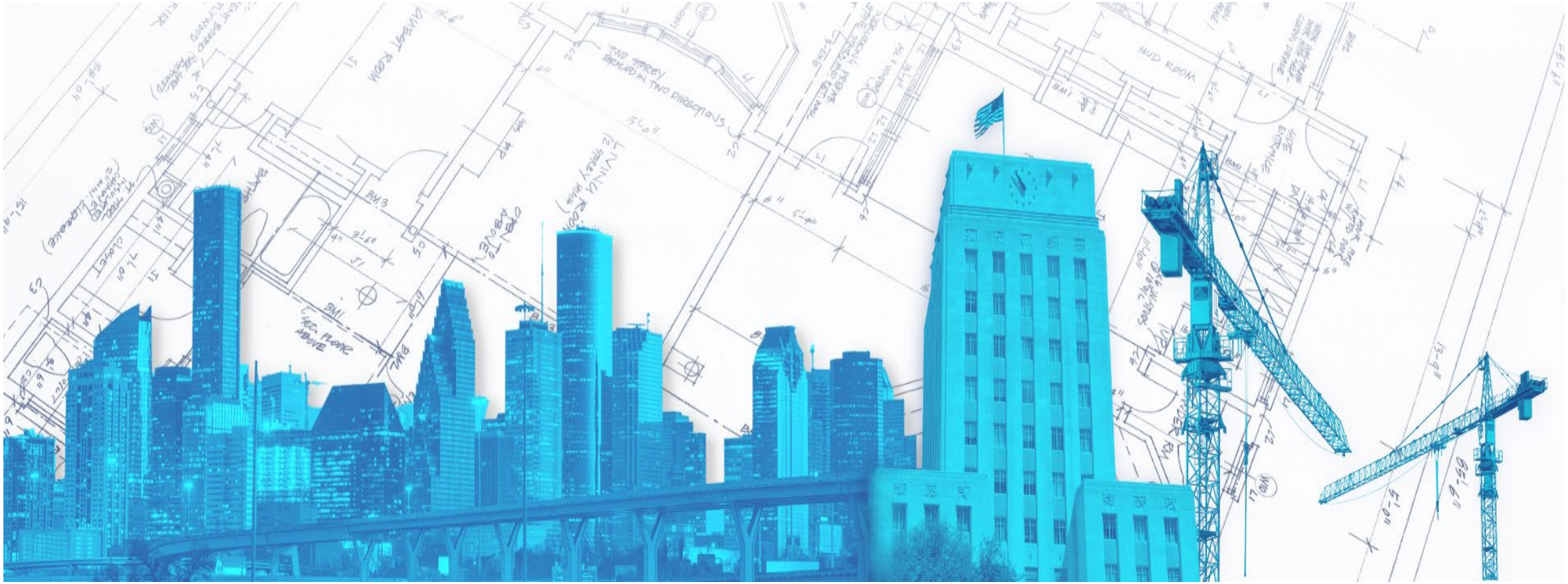
2018 IFC 916, 202: GAS DETECTION SYSTEMS

- Section 202: Revises definition of gas detection system
  - Specifies stand-alone devices not considered a gas detection system
- New Section 916: Gas Detection Systems
  - Clarifies and consolidates requirements for gas detection systems
  - Adds text in other chapters to correlate with Section 916

This gas detector is listed to detect natural gas or LP-gas.

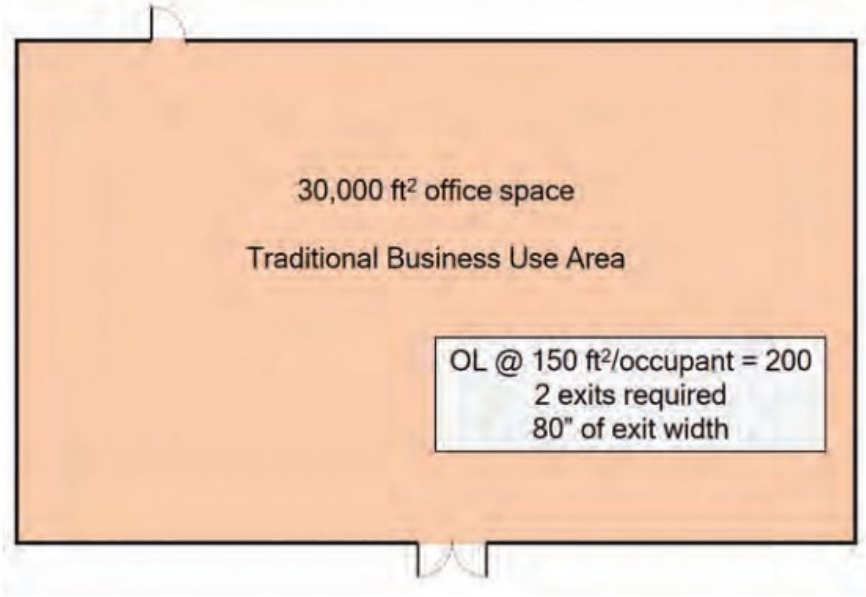
HOUSTON PUBLIC WORKS

IFC CHAPTER 10 MEANS OF EGRESS



2018 IFC TABLE 1004.5, 1004.8: OCCUPANT LOAD CALCULATION IN BUSINESS USE AREAS

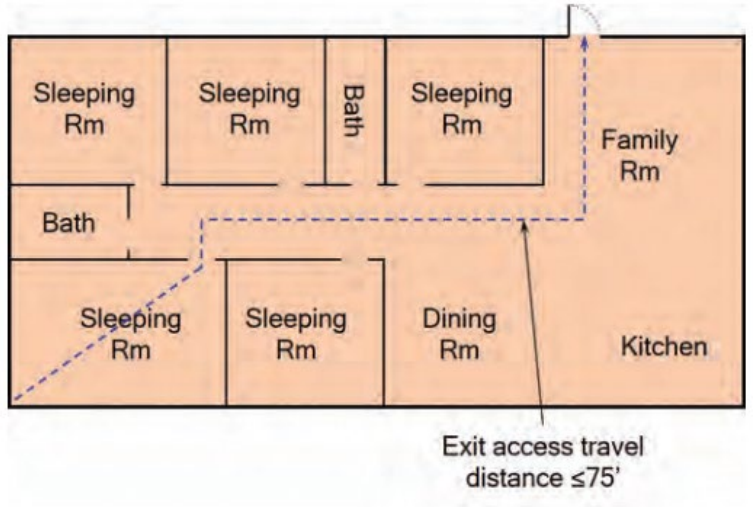
- Revises method of calculating occupant load in business areas
  - Occupant load factor: 100 ➔ 150 square feet per occupant
- New Section 1004.8: Concentrated business use areas
  - Applies to telephone call centers, trading floors, electronic data processing centers, and similar business use areas
  - Where approved, the occupant load minimum is 50 square feet per occupant using gross occupiable floor space



Typical business use is based on an occupant load factor of 150 square feet per occupant.

2018 IFC 1006.2.1: SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

- Correlates cumulative occupant loads with other code requirements
  - Maximum occupant load of space 10 ➔ 20 feet for Group R-2, R-3, and R-4 occupancies
- Clarifies exit requirements for foyers, lobbies, vestibules or similar spaces
  - New exception: The number of exits in intervening room not to be based on the cumulative occupant load of the building
  - Capacity of all exits to be based on the cumulative occupant load served



The exit access travel distance is limited to 75 feet in Group R-4 occupancies equipped with sprinkler systems designed to NFPA 13D.

2018 IFC 1006.2.2.6, 1006.2.1, 1017.2: GROUPS R-3 AND R-4 PROTECTED WITH NFPA 13D SPRINKLER SYSTEM

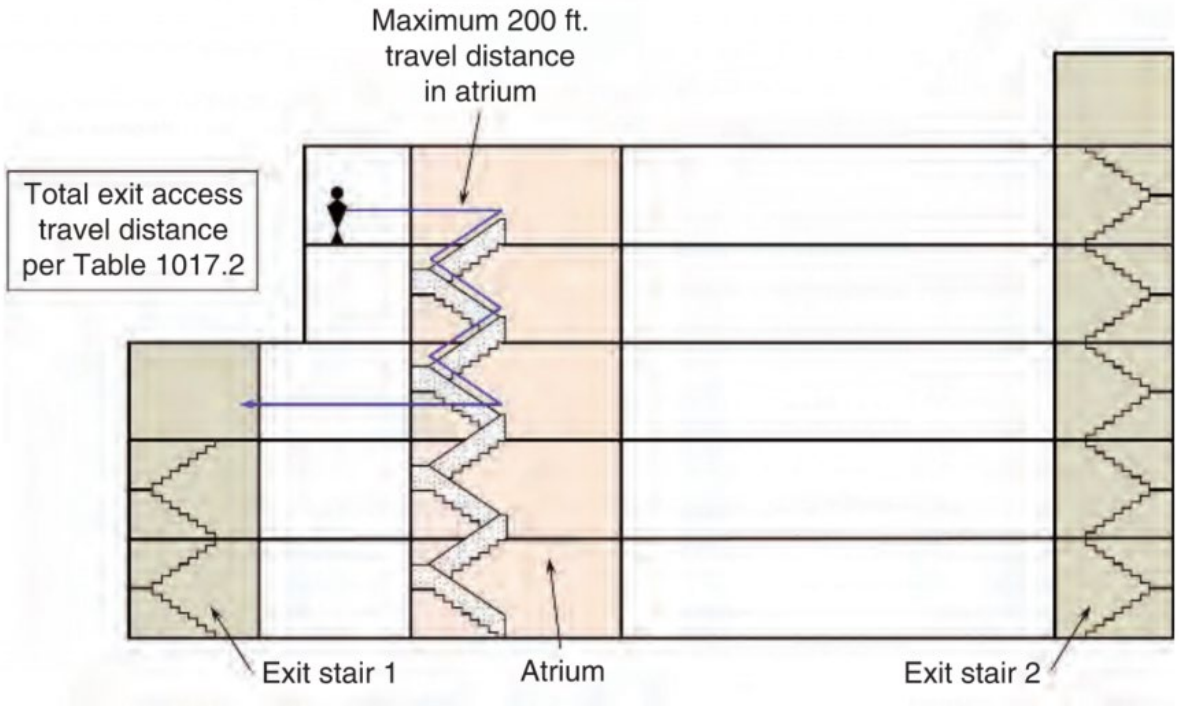
- New Section 1006.2.2.6: Groups R-3 and R-4
  - Exit access travel distances provided for Groups R-3 and R-4 occupancies with NFPA 13D sprinkler systems
    - Group R-3 occupancy: 125 feet
    - Group R-4 occupancy: 75 feet

2018 IFC 1006.3, 1006.3.1: EXITS ON ADJACENT STORIES

- Where stairways serve more than one story, only individual story load to be considered individually for calculating required number of exits
- New Section 1006.3.1 Adjacent story
  - Path of egress travel to an exit not permitted to pass through more than one adjacent story
    - Several exceptions for exit access stairways

2021 IFC 1006.3, 1006.3.1, 1006.3.2 EXCEPTION 3, 1017.3.2.3: EXIT ACCESS STAIRWAYS IN ATRIUMS

- Stairways/ramps within an atrium permitted to pass through more than one adjacent story if they comply with Section 404 in the International Building Code



The path of egress can pass through more than one story in the atrium.

2021 IFC 1006.3.2 EXCEPTION 7, 1006.3, 1006.3.1: EGRESS FROM OCCUPIED ROOFS

- Specifically states occupant load of an occupied roof is considered separately from the load on an adjacent story for calculating the number of exits required
- Path of egress travel permitted to pass more than one story in exterior exit access stairways and ramps between occupied roofs

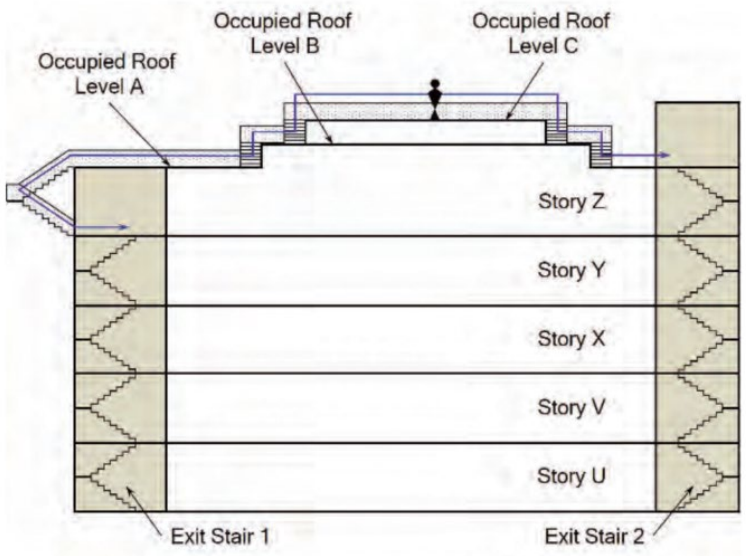


Figure A: Two paths of egress for Occupied Roof Level C.

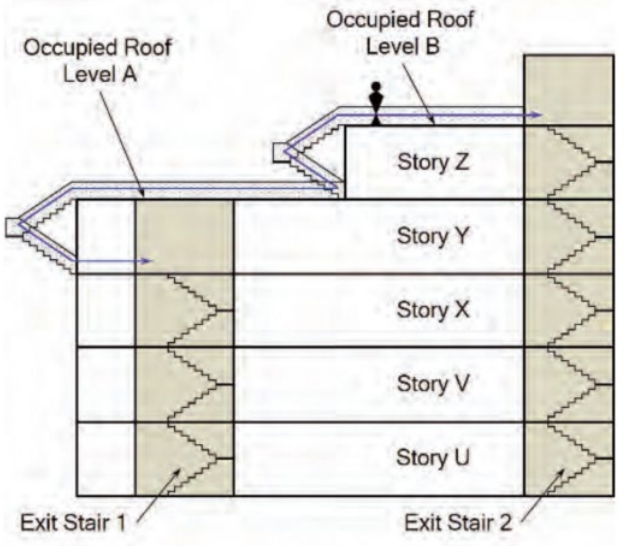
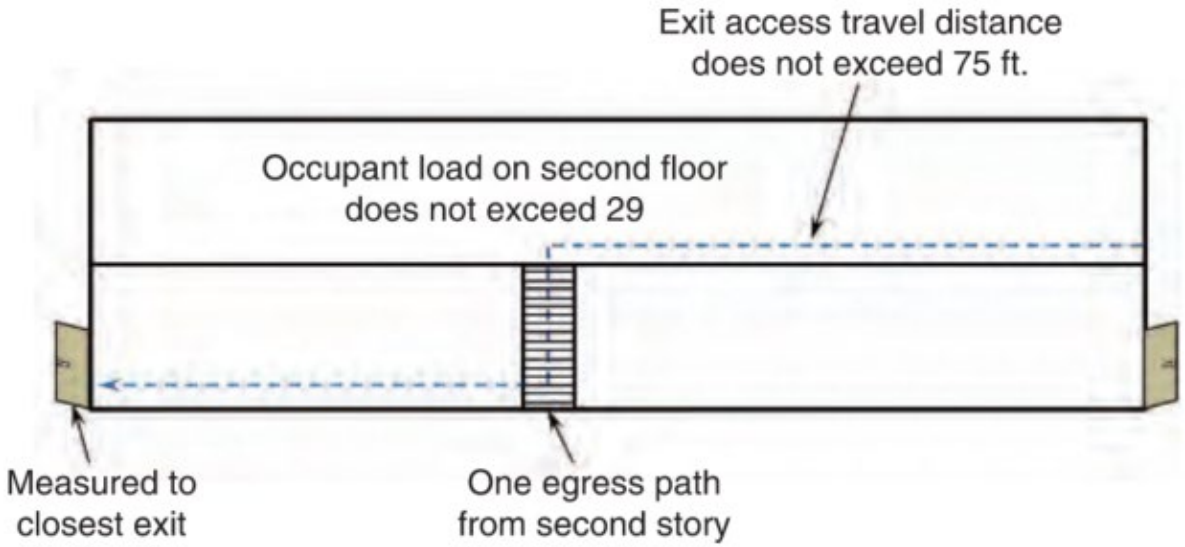


Figure B: Two paths of egress for Occupied Roof Level B.

2021 IFC 1006.3.4, TABLE 1006.3.4(1), TABLE 1006.3.4(2): SINGLE EXIT – EXIT ACCESS VS COMMON PATH

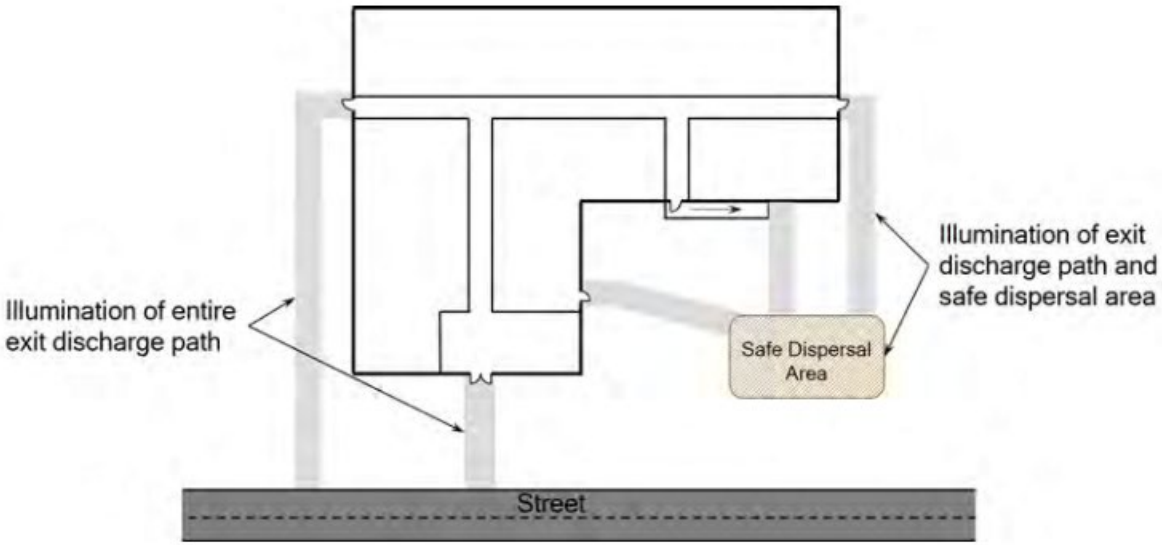
- Travel distance requirement for buildings or stories with one exit: limited by the common path of egress travel ➔ exit access travel distance



Occupants on the second floor have only one exit access stairway. This is allowed if the allowed occupant load is not exceeded and the exit access travel distance to an exit is not exceeded.

2018 IFC 1008.2.3: ILLUMINATION OF THE EXIT DISCHARGE

- New Section 1008.2.3: Exit discharge
  - Illumination required for the path of travel for the exit discharge
- Exceptions: Illumination not required where exit discharge path meets both:
  - Path of exit discharge is illuminated from the exit to a safe dispersal area complying with Section 1028
  - Dispersal area is illuminated to at least 1 footcandle at walking surface



Illumination of the exit discharge is required either to the public way, or to a safe dispersal area.

2018 IFC 1008.3.5, 1008.2.2: EMERGENCY ILLUMINATION IN GROUP I-2

- Emergency egress lighting in Group I-2 must meet minimum illumination levels even when one lamp fails in a single luminaire

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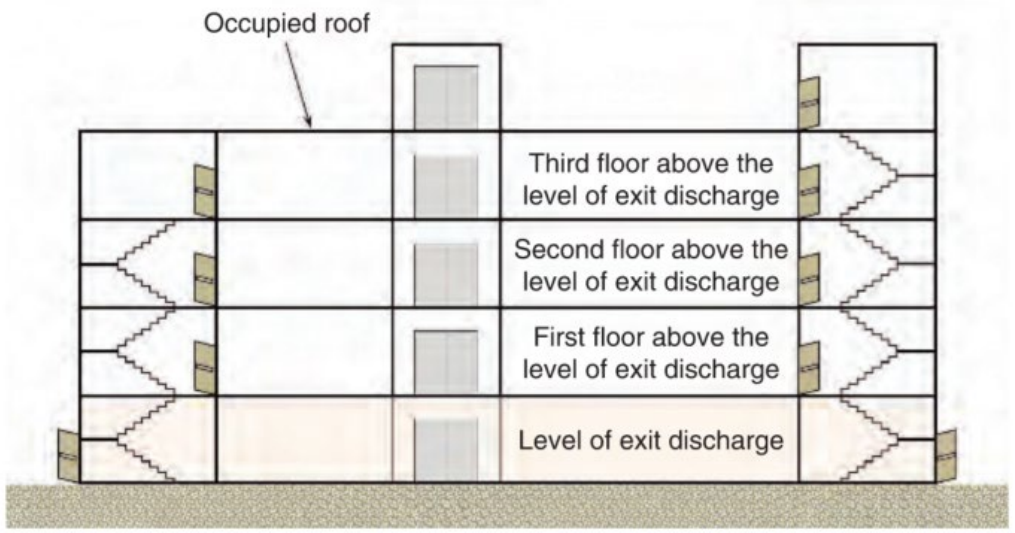
Emergency egress lighting in Group I-2 must maintain a minimum lighting level when one lamp, or bulb, fails in the emergency lighting units.

2021 IFC 1009.2.1: ELEVATOR SERVING OCCUPIED ROOF

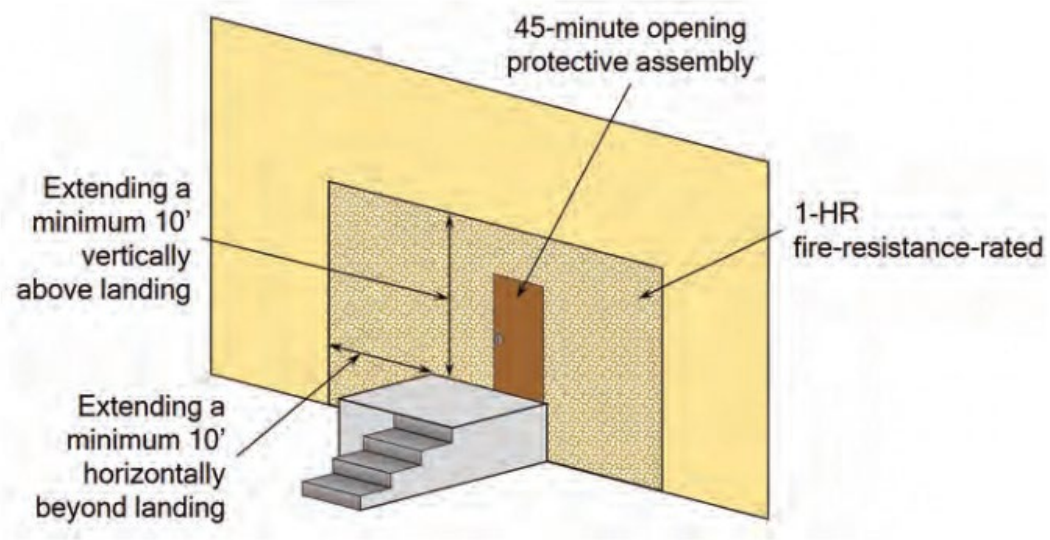
- Elevator requirements now consider an occupied roof as a story
  - Stories and occupied roofs both count towards requirement of 4 stories for accessible means of egress



This occupied roof will require access via an elevator since it is the fourth level above the level of exit discharge.

2018 IFC 1009.7.2: PROTECTION OF EXTERIOR AREAS OF ASSISTED RESCUE

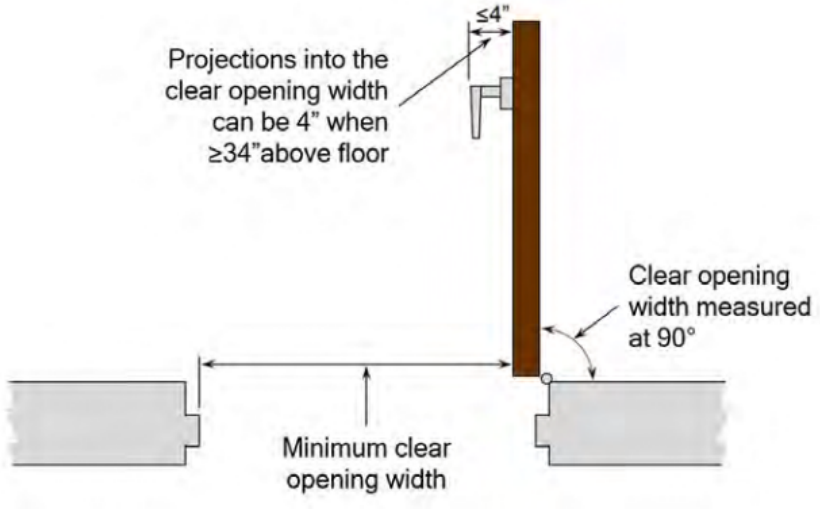
- New exceptions for protection requirements for areas of assisted rescue
  - 1-hour fire-resistance-rated separation not required where the building is equipped with NFPA 13 or 13R automatic sprinkler system



The exterior area of assisted rescue is protected by either fire-resistance-rated construction or the building is sprinklered to NFPA 13 or 13R.

2018 IFC 1010.1.1: SIZE OF DOORS

- Revises doors size requirements to correlate with other code sections
  - Language now consistent with ICC A117.1 “Accessible and Usable Buildings and Facilities,” ADA Standards, and FHA
  - Clarification to exceptions in door size requirements



The clear opening width is measured with the door open to 90 degrees. The required minimum clear opening width varies based on the occupancy.

2021 IFC 1010.1.1: SIZE OF DOORS

- Limit of swinging door size: 48 inches ➔ no limit
- Now 20-inch minimum width for nonaccessible door/shower compartments, toilet stalls, and fitting rooms
  - Applies to single user spaces

Exit doors and exit access doors are no longer limited to 48 inches in width. The width will be controlled by the pressure needed to open the door.

2018 IFC 1010.1.4.4: LOCKING ARRANGEMENTS IN EDUCATIONAL OCCUPANCIES

- New Section 1010.1.4.4 Locking arrangements in educational occupancies
  - Locks permitted in egress doors for Group E and Group B educational occupancies given certain conditions:
    - Door can be unlocked from outside the room
    - Door is openable from within the room
    - No modifications made to any listed door hardware
  - Remote operation of locks permitted

Photo courtesy of Schlage Lock Co., LLC (part of Allegion plc)

This electrically operated lock is openable from outside the classroom by entering the proper pass code.

2018 IFC 1010.1.9.8, 1010.1.9.8.1: DELAYED EGRESS

- Delayed egress locking systems permitted in additional occupancies
  - Previously permitted for doors in any occupancy except Group A, E, and H
  - Now permitted for Group E classrooms with automatic sprinkler system for occupant load under 50
  - Now permitted for Group A-3 courtrooms with automatic sprinkler system for exit access doors other than the main exit
- Egress path for Group I-1 or I-4 occupancies now permitted to pass through two delayed egress locking systems
  - Requires that the combined delay does not exceed 30 seconds and the building has an automatic sprinkler system

2018 IFC 1010.1.9.9, 1010.1.9.10: ELECTRICALLY LOCKED EGRESS DOORS

- Revised language of section regarding electrically locked egress doors
  - Correlates with other code sections addressing types of locking systems
  - Sensor release electric locks allowed on any door within exit path
  - Addresses all types of electrical locking systems

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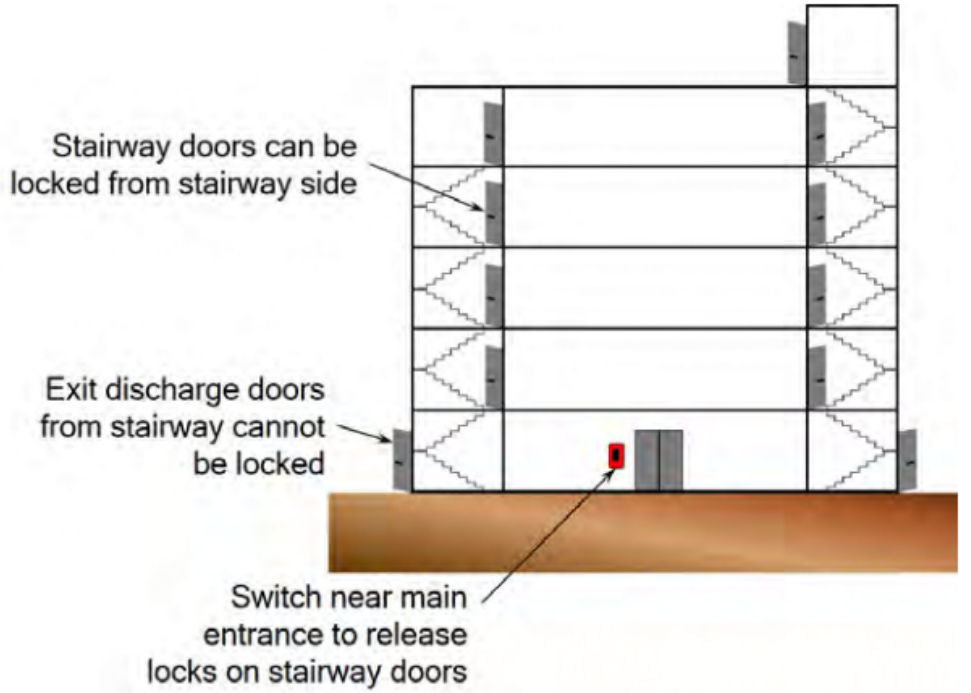
This pair of doors is electrically locked and provided with sensor release hardware.

2018 IFC 1010.1.9.12: LOCKS ON STAIRWAY DOORS

- Revised requirements for doors permitted to be locked from the side opposite the egress side
  - Permitted for stairways serving not more than four stories ➔ permitted for all stairway exit doors

1010.1.9.12 continues



Stairway doors can be locked from the stairway side on the condition that a switch is provided near the main entrance. For high-rise buildings, the switch shall be located in the fire command center.

2018 IFC 1010.1.10: PANIC HARDWARE AND FIRE EXIT HARDWARE

- Increases locking hardware allowances for Group A and E occupancies
  - Doors with panic or fire exit hardware now permitted to be electrically locked with sensor release
- Clarifies panic or fire exit hardware only required on swinging doors

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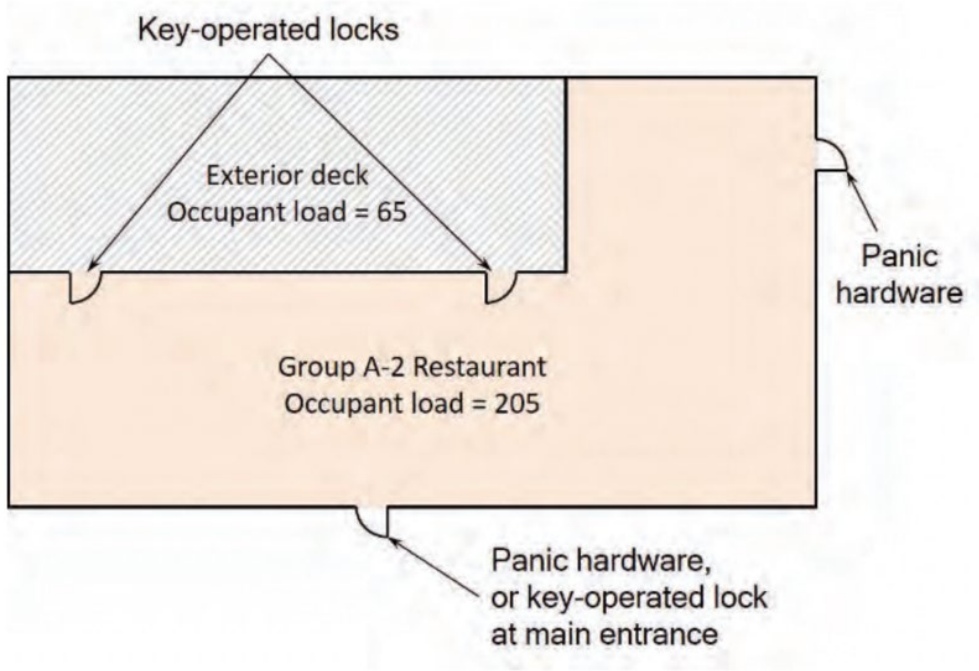
The panic hardware on these exit doors will release the electric lock.

2021 IFC 1010.2.4: LOCKS AND LATCHES

- Locks/latches conditionally allowed:
  - Group I-1 Condition 2 and Group I-2
    - Staff must be able to unlock doors at all times
  - Exit access doors other than egress courts
  - Doors to balconies or other exterior spaces serving dwelling/sleeping units
  - Doors to balconies or other exterior spaces with area of 250 square feet or less



The doors from the exterior deck are required to swing in the direction of egress. The locking device on these doors can be a key-operated deadbolt when specific precautions are taken.

2021 IFC 1010.2.8, 1010.2.8.1, 1031.2.2: LOCKING ARRANGEMENTS IN EDUCATIONAL OCCUPANCIES

- Group I-4 occupancies now allowed exit door locks for lockdown events
  - Remote locking permitted in addition to key locking

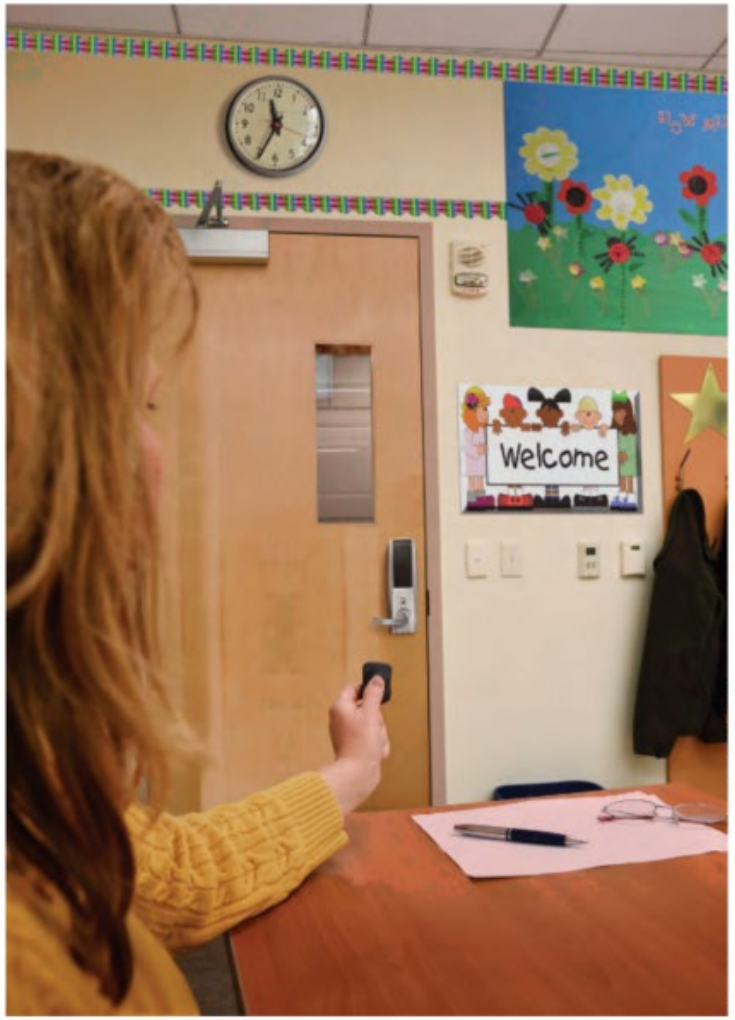


Photo courtesy of ASSA ABLOY

This classroom security lock can be operated remotely from inside the room or from the exterior.

2021 IFC 1010.2.9, 1010.2.9.1, 1010.2.9.2: PANIC HARDWARE AND FIRE EXIT HARDWARE

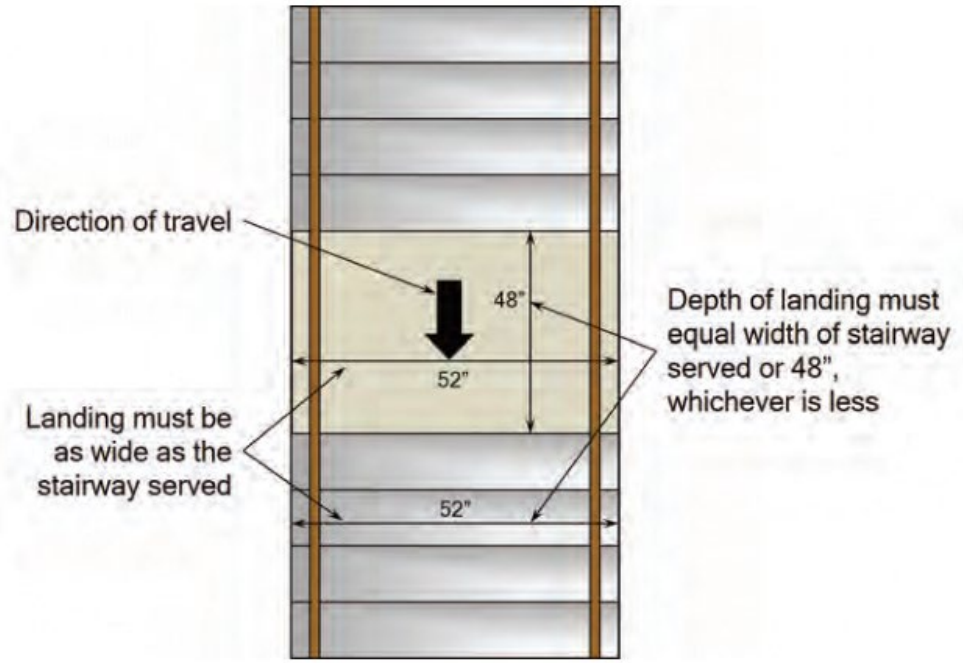
- New exception to requirement for swinging doors in Group H or swinging doors in Group A and E with occupant load over 50
  - Exit door to exterior areas permitted to be locked
- Panic/fire exit hardware required in refrigeration machinery rooms with area of 1,000+ square feet
  - Two exit access doorways required
- Panic/fire exit hardware required in electrical rooms
  - Locks not permitted with equipment rated to 1200 A ➔ 800 A

2018 IFC 1010.3: TURNSTILES

- Allows security turnstiles or similar barriers in means of egress path given:
  - Building protected with approved, supervised automatic sprinkler system
  - Turnstile lane configuration has a minimum clear passage width of 22 inches
  - Maximum egress capacity to be calculated using clear passage width
  - Each secured physical barrier to be able to automatically retract or swing to an unobstructed open position

2018 IFC 1011.6: STAIRWAY LANDINGS

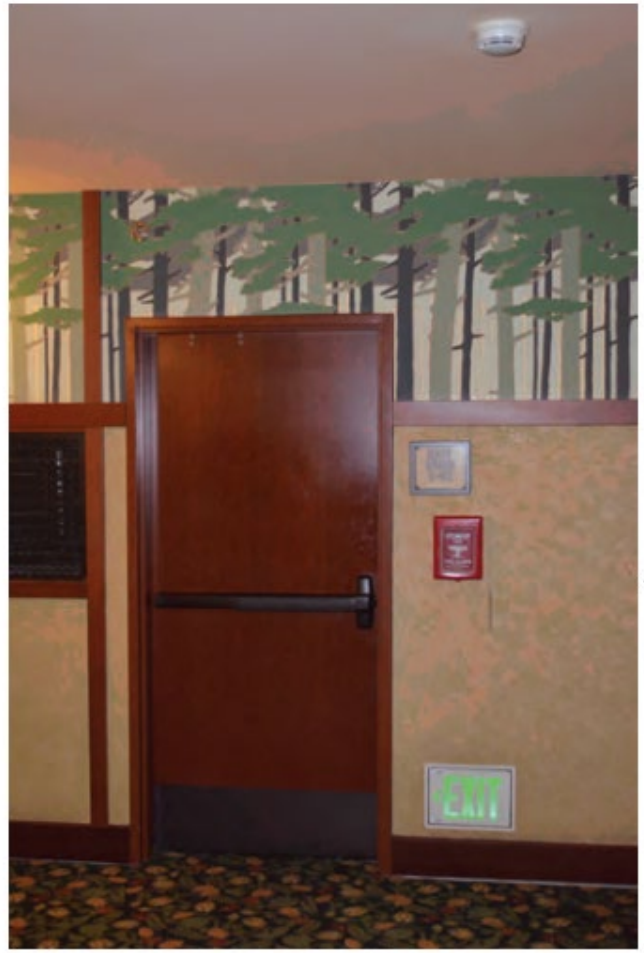
- Clarifies the method of determining the required width and depth of a stairway landing
  - Width of landings to be measured perpendicularly to the direction of travel
  - Depth of landings to be measured parallel to the direction of travel
  - Minimum depth of landings must be the width of the stairway or 48 inches, whichever is less



The width of the landing must be at least as wide as the stairway served. The depth must be at least as wide as the stairway served or 48 inches, whichever is less.

2018 IFC 1013.2: FLOOR-LEVEL EXIT SIGNS IN GROUP R-1

- Location of low-level exit sign requirements changed
  - Bottom of sign to be under 12 inches ➔ 18 inches above floor level



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The bottom of the low-level exit sign can be a maximum of 18 inches above the floor.

2018 IFC 1015.6, 1015.7: FALL ARREST FOR ROOFTOP EQUIPMENT

- Modifies criteria where guards are not required due to fall arrest equipment
  - Guards not required when fall arrest systems are installed that comply with ANSI/ASSE Z 359.1 and specific criteria ➔ ANSI/ASSE Z 359.1 only

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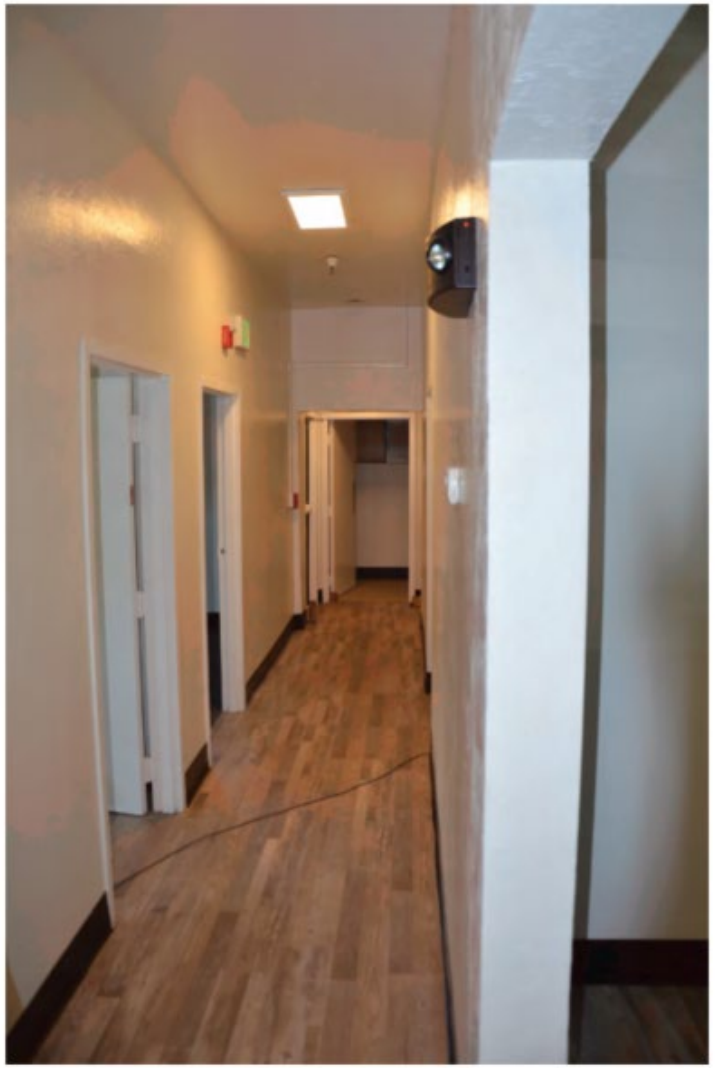
Anchor systems for fall arrest are specified in ANSI/ASSE Z395.1.

2018 IFC 1017.3, 202: COMMON PATH OF EGRESS TRAVEL

- Section 202: Revises definition of common path of egress travel
  - Correlates with Section 1017.3
- Section 1017.3: Clarifies common path of egress travel
  - Exit access travel distance to be measured from the most remote point within a story ➔ most remote point of each room, area, or space

2021 IFC 1020.5: DEAD-END CORRIDORS IN GROUP I-2

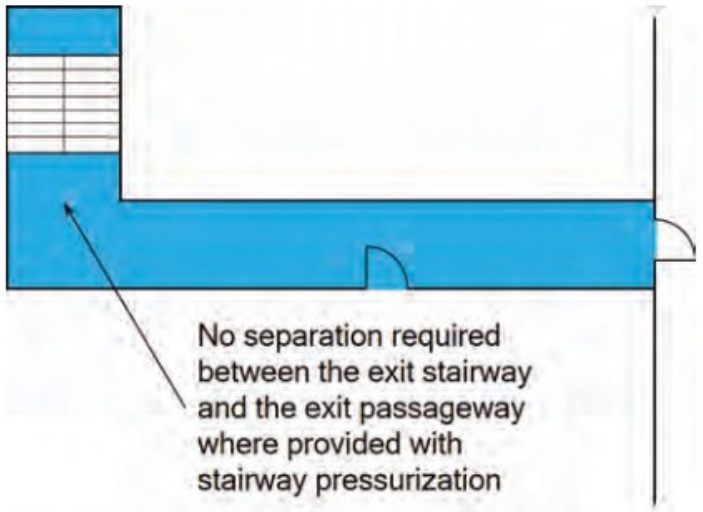
- Dead-end corridors now allowed a maximum of 30 feet in I-2 Condition 2 occupancies
  - Not permitted in patient rooms or treatment spaces



Dead-end corridors in non-patient areas of a hospital are allowed to be 30 feet in length.

2018 IFC 1023.3.1: STAIRWAY EXTENSION

- New exception to requirements for separation between an interior exit stairway and an exit passageway
  - Not required where the exit stairway and the exit passageway are provided with stairway pressurization



Where stairway pressurization is provided, a fire-resistance-rated separation between an interior exit stairway and exit passageway is not required. Since the rated separation is not required, neither is the wall or door.

2018 IFC 1023.5, 1024.6: EXIT STAIRWAY AND EXIT PASSAGEWAY PENETRATIONS

- Reformats allowances of penetrations into fire-resistant-rated enclosures of both exit passageways and interior exit stairways and ramps
  - Penetrations for two-way communication and security systems are now permitted

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Components for two-way communication are allowed to penetrate the interior exit stairway enclosure. Note that the membrane penetration for the electrical outlet in the wall is only permitted on the exterior of the enclosure.

2018 IFC 1025.1: LUMINOUS EGRESS PATH MARKING IN GROUP I OCCUPANCIES

- Revision to luminous egress path marking requirements in high-rise buildings
  - Luminous egress path markings required for Group I ➔ I-1 occupancies

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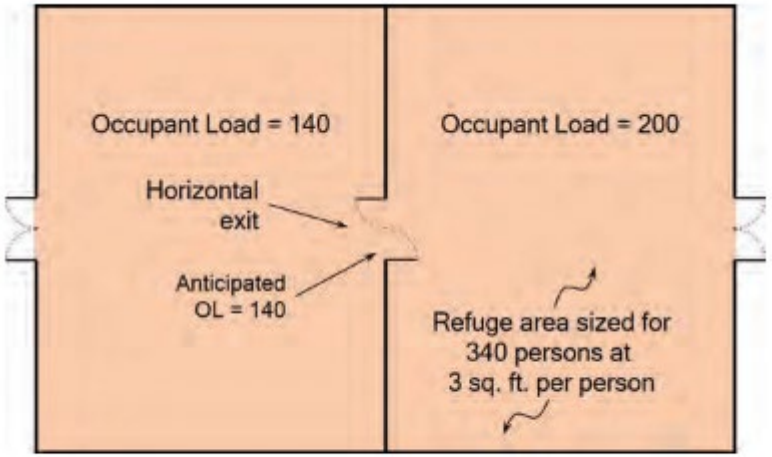
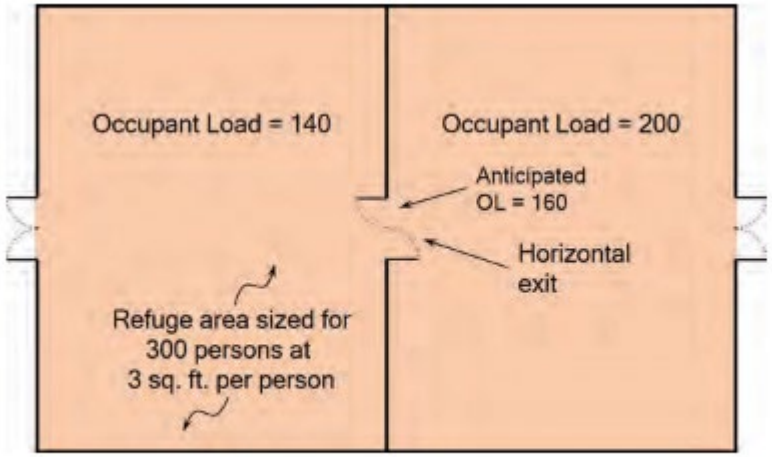
Luminous egress path marking within an interior exit stairway in a high-rise building.

2018 IFC 1026.4, 1026.4.1: REFUGE AREAS FOR HORIZONTAL EXITS

- Clarification on occupant load calculations for refuge areas
  - Anticipated occupant load of refuge areas to be based on total occupant load, but not to exceed the capacity of horizontal exits
  - Refuge area capacity now references the International Building Code for capacity requirements



The entire occupant load of the adjacent space is added when determining the size of the refuge area.



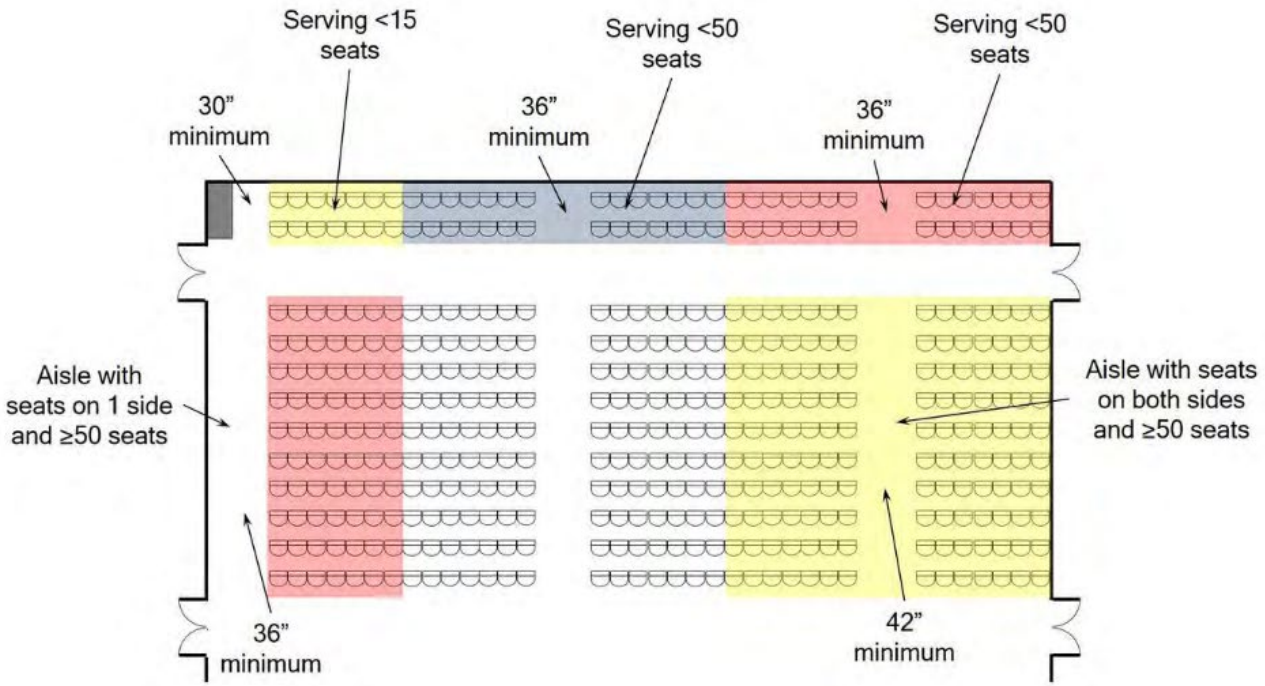
The additional occupant load from the adjacent space is limited by the egress of the horizontal exit when determining the size of the refuge area.

2018 IFC 1029.6, 1029.6.3, 1029.7, 202: OPEN-AIR ASSEMBLY SEATING

- Section 202: Establishes assembly seating definitions
  - Defines open-air assembly seating
  - Clarifies the definition of smoke-protected assembly seating
- Section 1029: Revises code
  - Reworded for consistency and correct code terminology

2018 IFC 1029.9.1: MINIMUM AISLE WIDTH

- Clarifies requirements for minimum aisle widths in assembly occupancies
  - Revises section for consistency with overall code language



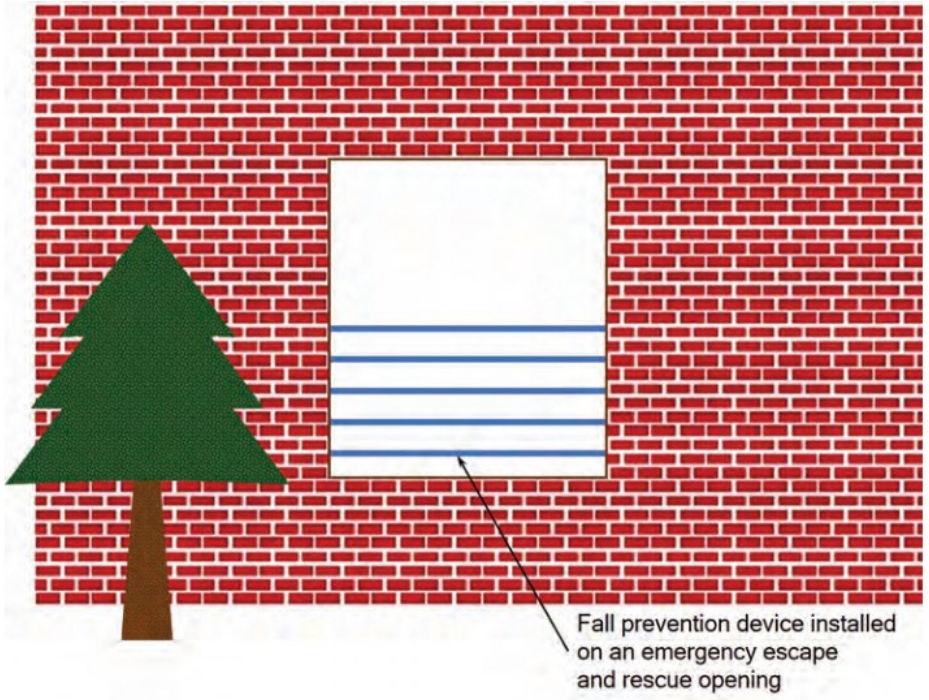
The aisle width can be reduced to 30 inches where the aisle is not required to be an accessible aisle and it serves less than 15 seats.

2018 IFC 1030.1: EMERGENCY ESCAPE AND RESCUE OPENINGS

- Clarifies requirements for emergency escape and rescue openings
  - Group R-2: only applies if occupancy is located on a story with one exit
  - Requirements for Group R-3 ➔ Group R-3 and Group R-4
- Groups R-2 and R-3 basements with automatic sprinkler system are now allowed to provide two means of egress consisting of either:
  - One means of egress and one emergency escape and rescue opening.
  - Two means of egress

2018 IFC 1030.1.1: OPERATION OF EMERGENCY ESCAPE AND RESCUE OPENINGS

- New section 1030.1.1: Operational constraints and opening control devices
  - Emergency escape and rescue openings to be operational from the inside without the use of keys or tools
  - Window-opening control devices complying with ASTM F 2090 permitted for use on windows
- Section 1030.5: Revised for clarity
  - Now references bulkhead enclosures



The fall prevention device must be openable since the window is an emergency escape and rescue opening.

2021 IFC 1030.16, 1030.16.1: HANDRAILS AT SOCIAL STAIRS

- Stepped aisles ("social stairs") with seating on one side and an aisle width of 74 inches now requires 2 handrails
- Where 2 handrails are required:
  - One handrail to be within 30 inches horizontally of the side of the tiered floor adjacent to the stepped aisle
  - Mid-aisle handrail to be discontinuous

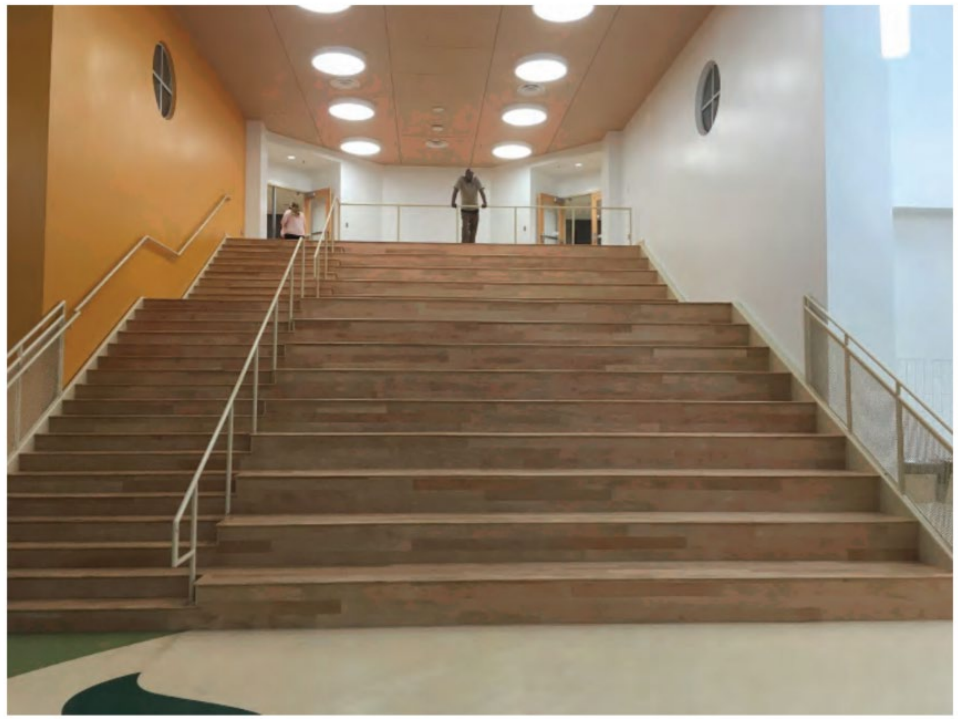


Photo courtesy of John R. Swanson

The stepped aisle serving these social stairs requires a handrail on one side when the stepped aisle is less than 74 inches wide.

2018 IFC 1031.2.2: LOCKING ARRANGEMENTS IN EXISTING EDUCATIONAL OCCUPANCIES

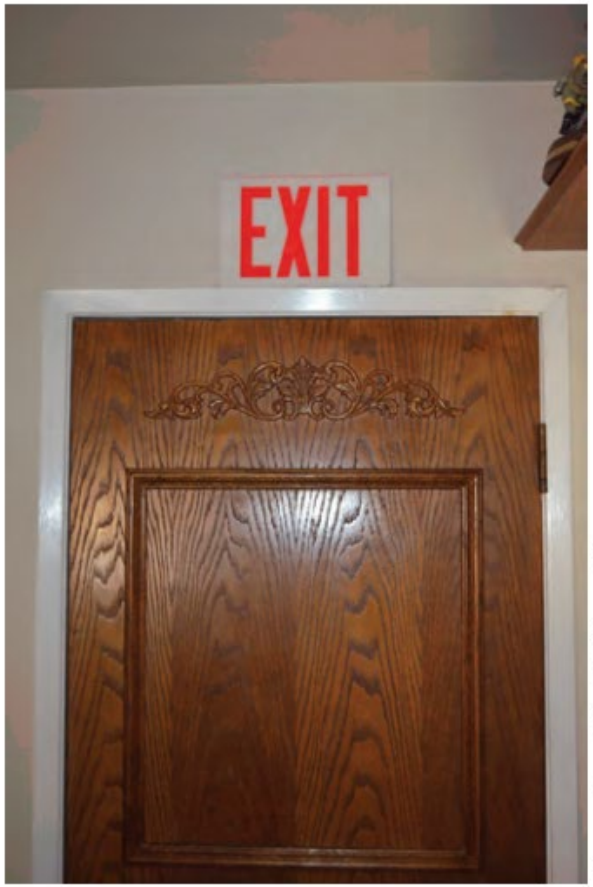
- New section 1031.2.2: Locking arrangements in educational occupancies
  - Locks permitted in egress doors for Group E and Group B educational occupancies given certain conditions:
    - Door can be unlocked from outside the room
    - Door is openable from within the room
    - No modifications made to any listed door hardware

Photo courtesy of ASSA ABLOY

A fob is used to operate this classroom security lock from inside the room.

2018 IFC 1031.4: EXIT SIGNS IN EXISTING BUILDINGS

- Clarifies exit sign requirements for installation and maintenance
  - Exit signs to be installed and maintained in accordance with the building code that was in effect at the time of construction



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Existing exit which must be illuminated under normal lighting and emergency lighting.

2018 IFC 1031.10: INSPECTION AND TESTING OF EMERGENCY EGRESS LIGHTING

- Revises requirements for emergency lighting equipment inspection and testing
  - Section 604.6 ➔ Section 1031.10
  - Equipment to be tested monthly for at least 30 seconds
  - Self-testing and self-diagnostics permitted alongside manual testing
  - References Section 108 for maintenance requirements

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Emergency egress lighting is manually tested monthly unless equipped with self-testing and self-diagnostics.

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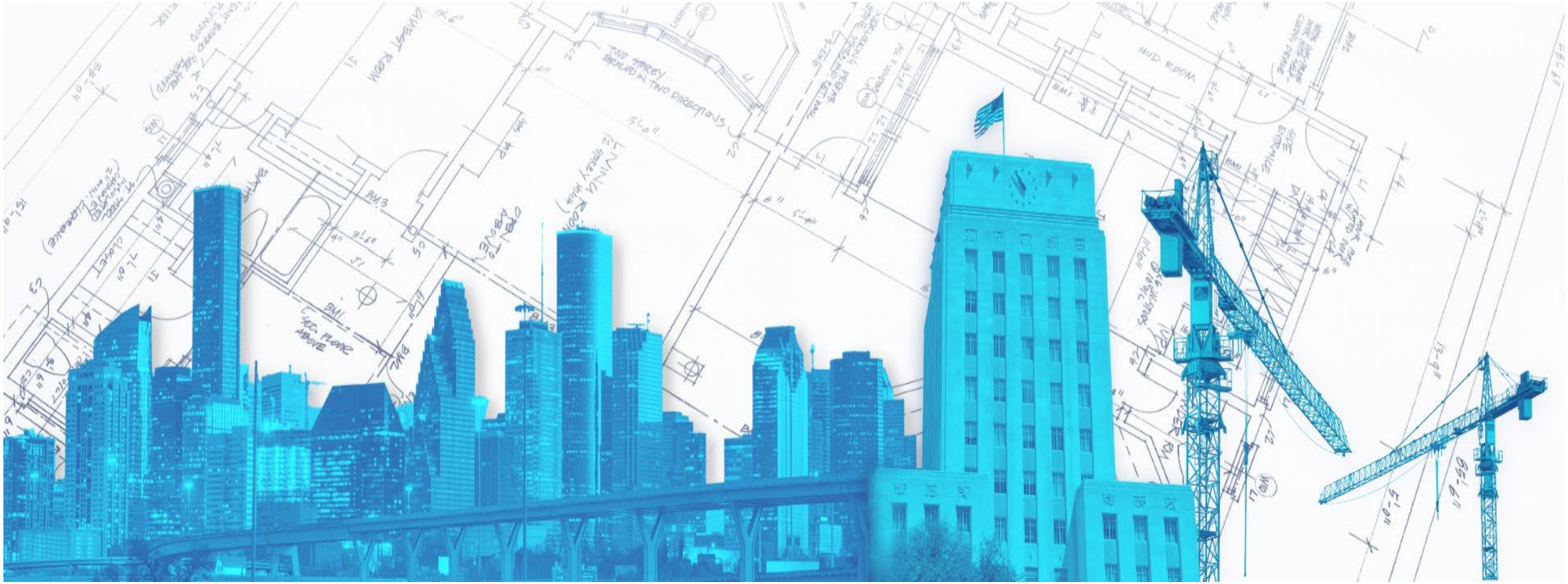
IFC CHAPTER 11 CONSTRUCTION REQUIREMENTS FOR EXISTING BUILDINGS



2018 IFC 1103.5.1: FIRE SPRINKLERS IN EXISTING GROUP A-2 OCCUPANCIES

- New section 1103.5.1: Group A-2
  - Requires automatic sprinkler system in existing Group A-2 occupancies where both conditions occur:
    - Occupant load is 300 or more
    - Alcoholic beverages are consumed in the facility

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Existing Group A-2 occupancies will be required to install an automatic sprinkler system if the occupant load is 300 or more.

2021 IFC 1103.5.4: SPRINKLERS IN HIGH-RISE BUILDINGS

- Unsprinklered high-rise buildings must install either an automatic sprinkler system or meet specific egress and fire alarm criteria
  - Building owners must file compliance schedule 1 year after written notice
  - Schedule not to exceed 12 years until completion

Unsprinklered high-rise buildings with a floor greater than 120 feet above the lowest level of fire department vehicle access would be required to be retrofit with an automatic sprinkler system.

2021 IFC 1103.7.5.1: GROUP R-1 HOTEL AND MOTEL FIRE ALARM SYSTEM

- R-1 hotels now require manual fire alarm if 20+ sleeping rooms or 3+ stories ➔ one story
  - New exception: not required in buildings not more than three stories, 20 or less sleeping units, and has an automatic sprinkler

Retrofit of Manual Fire Alarm System in Existing *SPRINKLERED* Group R-1

Number of Units	Number of Stories		
	1 story	2 or 3 stories	>3 stories
≤20 units	Not required	Not Required	Required[b]
>20 units	Required[a,b]	Required[b]	Required[b]

a. Exception 1 eliminates the fire alarm system for one-story buildings if the building meets the requirements.
b. Exception 3 eliminates all but one manual fire alarm box.

Retrofit of Manual Fire Alarm System in Existing *NONSPRINKLERED* Group R-1

Number of Units	Number of Stories		
	1 story	2 or 3 stories	>3 stories
≤20 units	Not required	Required	Required
>20 units	Required[a]	Required	Required

a. Exception 1 eliminates the fire alarm system for one-story buildings if the building meets the requirements.

2018 IFC 1103.9: CARBON MONOXIDE ALARMS IN EXISTING BUILDINGS

- Revises requirements for carbon monoxide alarms
  - Alarms required in existing Group I-1, I-2, I-4, and R occupancies ➔ required in existing dwelling and sleeping units where required in Section 915
  - Battery operated carbon monoxide alarms permitted under either condition:
    - Where code in effect did not require carbon monoxide detectors
    - In dwelling units that are not served from commercial power sources

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Combination smoke alarm and carbon monoxide alarm installed on the ceiling.

2021 IFC 1103.9: CARBON MONOXIDE DETECTION IN EXISTING BUILDINGS

- Specifies Carbon monoxide detection requirements
  - Detection required in existing dwelling and sleeping units ➔ existing Group I-1, I-3, I-4 and R occupancies and in existing classrooms in Group E

This carbon monoxide alarm is a combination smoke alarm and CO alarm.

2018 IFC 1104.16.2: WALL OPENINGS ADJACENT TO FIRE ESCAPES

- Door and window openings within 10 feet of a fire escape must be protected with ¾-hour opening protectives unless the building is sprinklered

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All of the windows and doors in this wall are required to be protected with ¾-hour assemblies, or the building can be equipped with an automatic sprinkler system.

2018 IFC 1105.6.2: FIRE-PROTECTION-RATED DOORS IN EXISTING GROUP I-2

- New section 1105.6.2: Group I-2 occupancies
  - Fire-protection-rated doors in existing Group I-2 occupancies to automatically close upon any of the conditions:
    - Actuation of smoke detectors
    - Activation of fire alarm system
    - Activation of automatic sprinkler system

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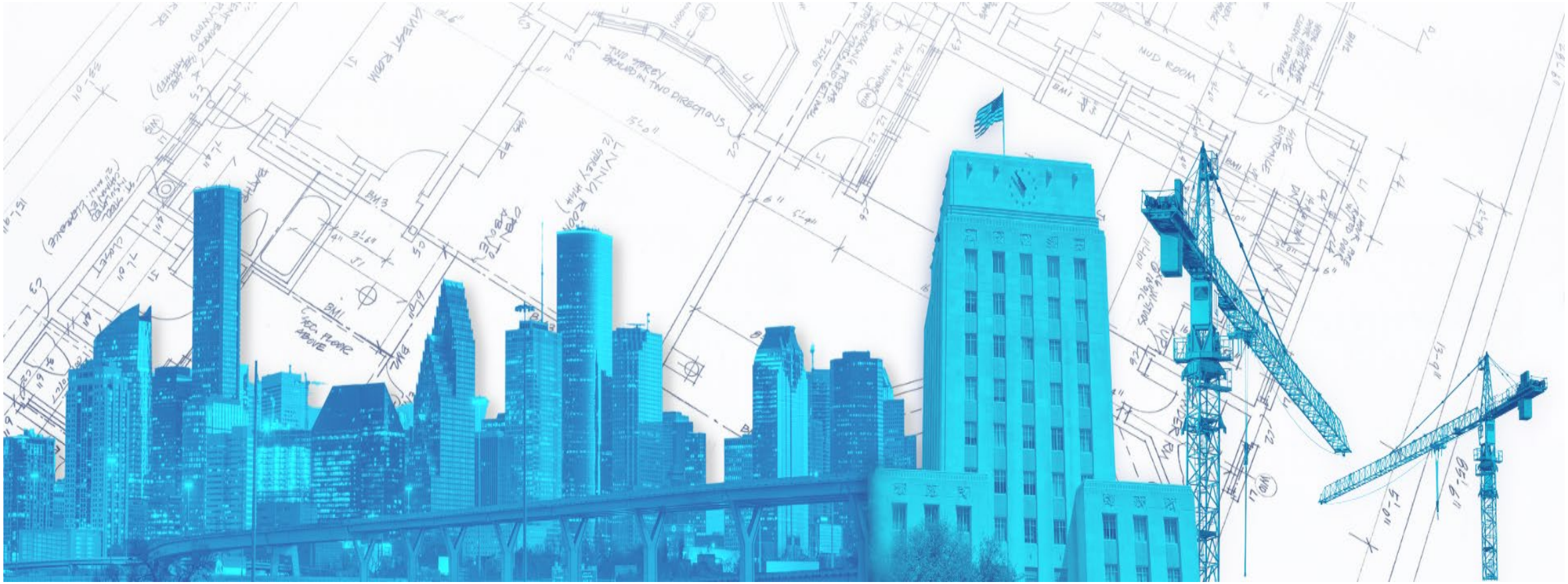
A hold-open device installed at a smoke compartment separation in an existing building.

IFC CHAPTER 12 ENERGY SYSTEMS



2018 IFC CHAPTER 12: ENERGY SYSTEMS

- New Chapter 12
  - Address all configurations of energy systems
  - Moves requirements from Chapter 6 for emergency power, standby power, and stationary battery storage system
  - New requirements for other methods of energy generation and storage: fuel cell power systems, capacitor energy storage systems, etc.

Photo courtesy of Ioxus, Inc.

Safety features for this capacitor energy storage system are now included in Chapter 12.

2021 IFC 1203.1.2: FUEL LINE PIPING PROTECTION

- New options for protecting emergency/standby generator fuel supply line
  - 2 hour fire-resistant rated pipe-protection system
    - If sprinklered, can be reduced to 1 hour
  - Other approved methods

Photo courtesy of 3M

Listed piping protection with a 2-hour fire-resistance rating has been installed to protect the piping carrying fuel to the generator.

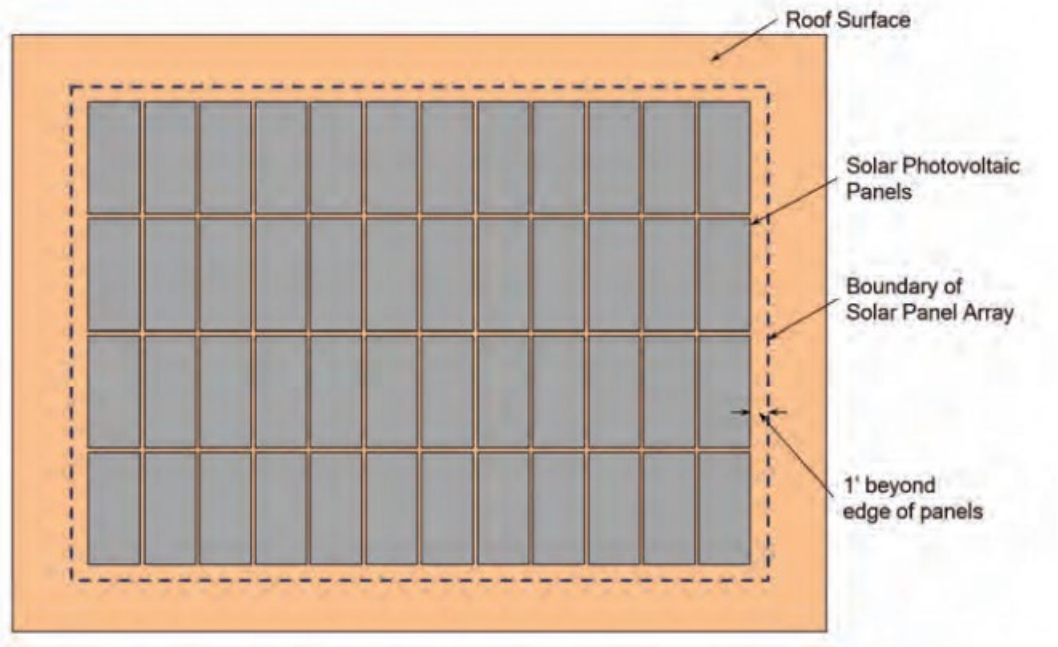
2021 IFC 1204, 202: PORTABLE GENERATORS

- Section 202: Defines portable generator
  - A mobile internal combustion engine-driven device that provides temporary electrical power
  - Includes hand-portable, wheeled, trailer-mounted, and motor vehicle-mounted generator sets
  - Does not include generators in permanent, fixed installations
- New Section 1204: Addresses use, operation, maintenance, and safety issues of portable generators

This mobile generator is considered a portable generator and is required to be provided with a grounding rod during use.

2018 IFC 1204.5: RAPID SHUTDOWN FOR SOLAR PHOTOVOLTAIC POWER SYSTEMS

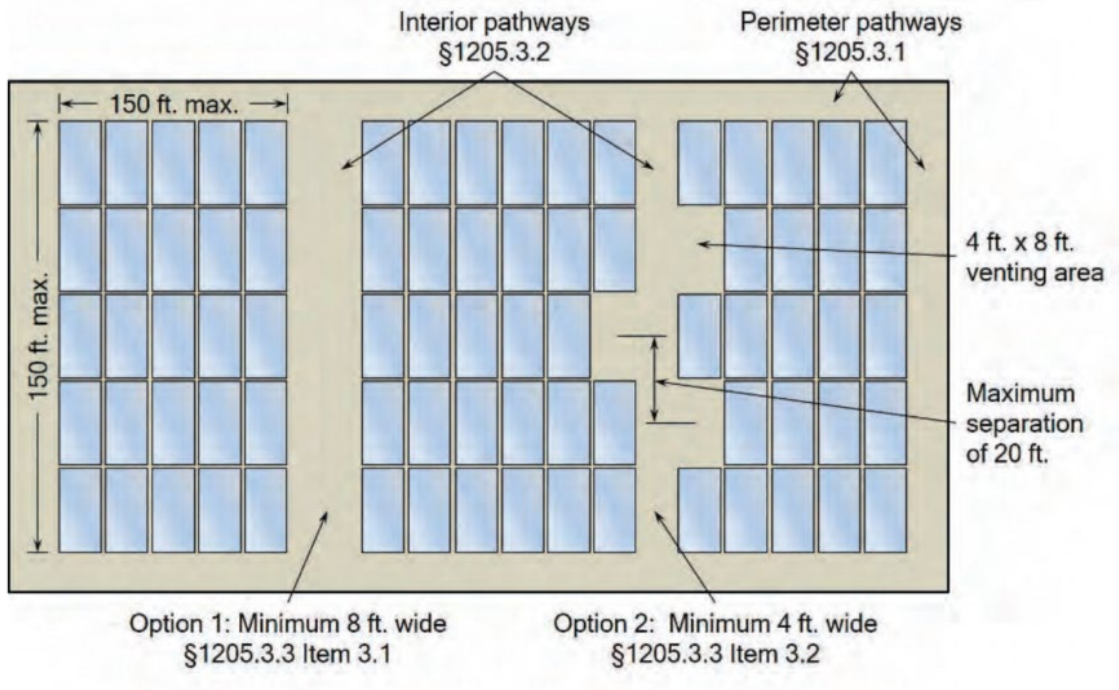
- New requirements for rapid shutdown of solar photovoltaic systems
  - Sign to identify the system rapid shutdown switch
  - Sign to identify the type of shutdown system



Rapid shutdown must occur for all circuits outside of the boundary of the solar photovoltaic panel array. The boundary is 1 foot outside of the edge of the solar panels.

2021 IFC 1205.3.3: SMOKE VENTILATION WITH SOLAR PV

- Clarifies requirement for access pathways to smoke/heat vents for solar photovoltaic power systems
  - Gravity-operated dropout smoke/heat vent: pathway 4+ feet wide
  - 2 options for smoke ventilation options between array sections
    - Pathway 8+ feet wide
    - Pathway 4+ feet wide with 4x8 foot vent cutouts every 20 feet



2018 IFC 1206.2, 202: STATIONARY STORAGE BATTERY SYSTEMS

- Section 1206.2: Addresses stationary battery storage system requirements
  - Text moved: Section 608 ➔ Section 1206.2
  - Includes new battery technologies and required safety features
  - Revises battery requirements
- Section 202: Revises battery definitions
  - Defines stationary storage battery system
  - Defines new battery and system types
    - Flow, lead-acid, lithium-ion, nickel-cadmium, prepackaged stationary storage battery system, sodium-beta storage, stationary storage, energy management systems, stationary battery array

2021 IFC 1207: ELECTRICAL ENERGY STORAGE SYSTEMS (ESS)

- Entire section reformatted and replaced
  - Encompasses greater types of ESS technologies
  - New requirements for retrofitting existing ESSs or repurposing batteries for ESS use
  - Specifies protection requirements for each type of battery
  - Addresses explosion control in the event of thermal runaway
  - Removes ESS from incidental use classification
  - Covers mobile ESS operations

Photo courtesy of Getty Images

Battery storage systems and other types of energy storage systems are regulated in Section 1207.

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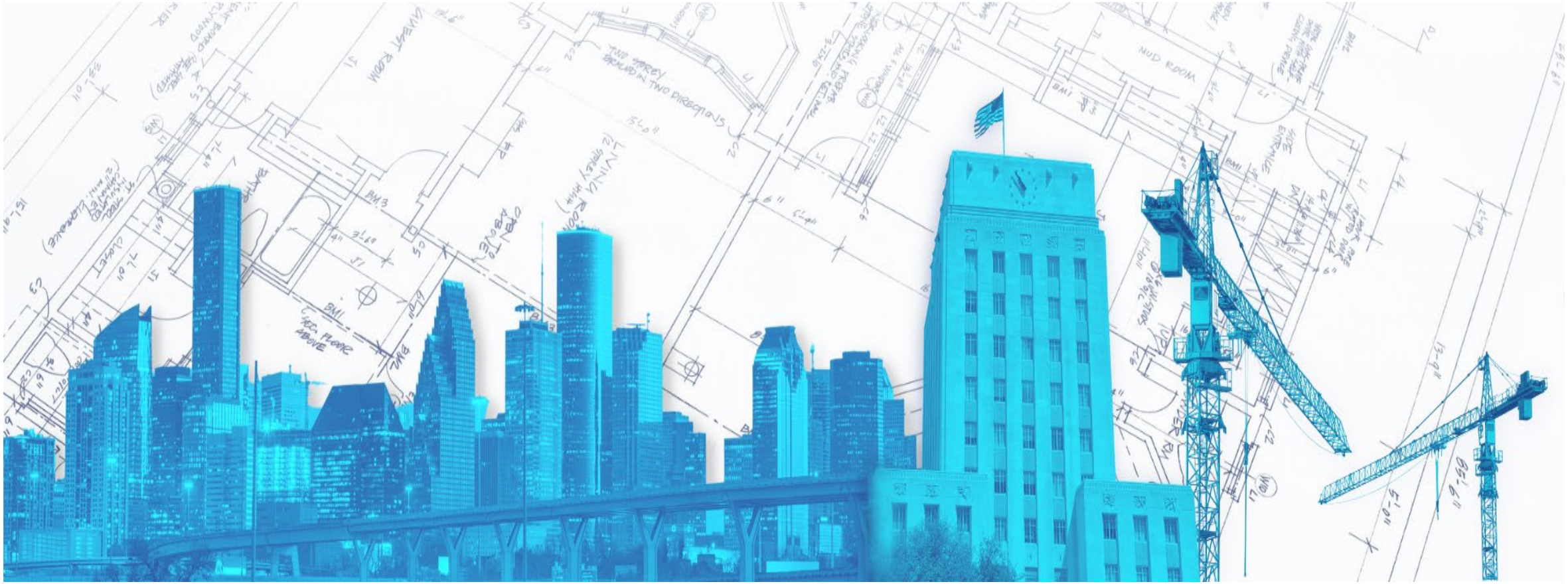
IFC CHAPTER 22 COMBUSTIBLE DUST-PRODUCING OPERATIONS



2018 IFC CHAPTER 22: COMBUSTIBLE DUST

- Revises chapter to new NFPA standards
  - Now refers to NFPA 652 “Standard on the Fundamentals of Combustible Dust”

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This sanding operation is creating combustible dust.

2021 IFC CHAPTER 22: COMBUSTIBLE DUST-PRODUCING OPERATIONS

- Entirety of Combustible Dust-Producing Operations revised
  - Includes criteria for combustible dust mitigation
  - Provides guidance for fire code inspector

The depth of the dust layer on horizontal surfaces would be measured to determine if the critical depth layer is exceeded.

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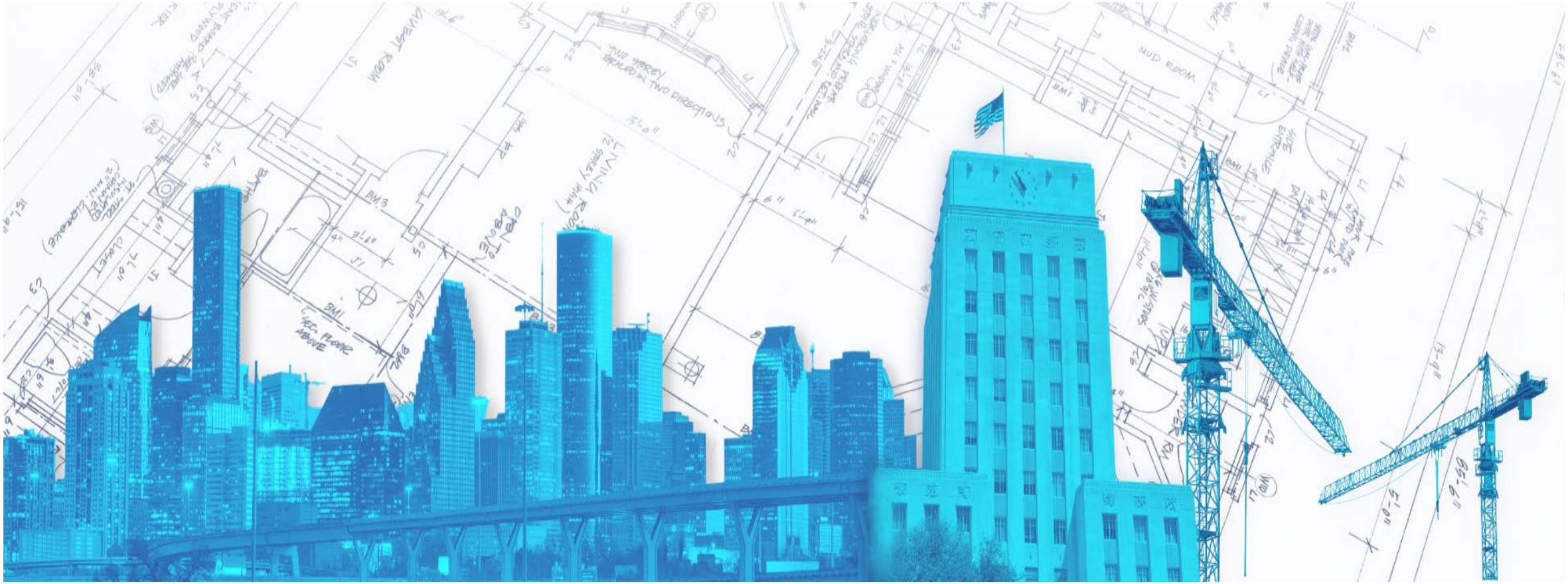
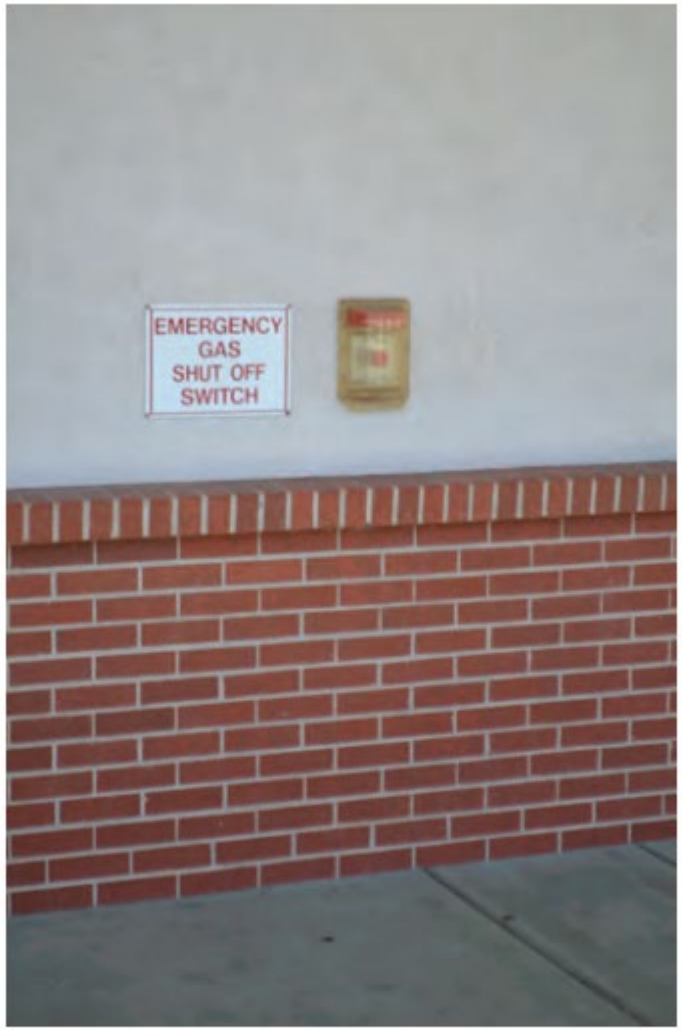
IFC CHAPTER 23 MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES



2018 IFC 2303.2.1: HEIGHT OF EMERGENCY DISCONNECT SWITCH

- New specifications of height for emergency disconnect switches for fuel dispensing operations
  - Height to be between 42 inches and 48 inches, measured vertically from floor level to the button.



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The emergency disconnect switch must be in a location that is provided with ready access.

2018 IFC 2306.7.3.1: PROTECTION FROM VEHICLE IMPACT

- Authorizes fire code official additional vehicle impact protection at fuel dispensing facilities if dispensing devices are located near:
  - Parking areas
  - Multiple dispensing devices
  - Highway on- and off-ramps
  - Other areas with higher potential for vehicle impacts

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Fuel dispensing island with additional impact provided adjacent to middle dispensers.

2021 IFC 2308.1, 2308.2, 2308.2.3, 2308.2.4: CNG VEHICLE FUELING

- Fuel-dispensing facilities for compressed natural gas allowed for residential and non-residential appliances
  - Previously only allowed for residential occupancies
  - Now references Section 413 of the International Fuel Gas Code

Photo courtesy of Tatomm/iStock / Getty Images Plus/Getty Images

Listed residential fueling appliances for compressed natural gas allow the homeowner to refuel at home.

2018 IFC 2309.6, 2309.6.1: DEFUELING OF HYDROGEN FUELED VEHICLES

- Revises Section 2309.6 to address current technologies and processes for repairing vehicles fueled by compressed or liquefied hydrogen gas
  - Requirements for vehicle repair include list of specific requirements ➔ references Chapters 53 and 58 and NFPA 2
  - Requires documented procedures that explain defueling or discharging operations on site

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This equipment is used to refuel and defuel hydrogen-fueled vehicles.

2018 IFC 2311.6, TABLE 2311.6.2: REPAIR OF VEHICLES FUELED BY CNG AND LNG

- New Section 2311.6: Vehicles powered by liquefied natural gas (LNG) and compressed natural gas (CNG)
- For both LNG and CNG, vehicle fuel system pressures to be measured and recorded prior to entering repair facility
  - LNG: Maximum allowable system pressure 170 pig
  - CNG: Maximum allowable system pressure indicated in new Table 2311.6.2

2018 IFC 2311.8: REPAIR OF VEHICLES FUELED BY LIGHTER-THAN-AIR FUELS

- New exceptions to the scope of requirements on repair garages for vehicles fueled by lighter-than-air fuels
  - Exempts vehicles that either empty and purge fuel tanks with nitrogen or the operating procedures monitor gas pressures on a routine basis
  - Exempts repair work on areas other than the fuel tank where pressures are maintained below 250 psig
- Adds requirements to ensure LNG and CNG fuels are not released during the repair process
- Allows ventilation and construction requirements to apply to either a room used for repair or a repair booth

2021 IFC 2311.8: REPAIR OF LIGHTER-THAN-AIR FUELED VEHICLES

- Modifies exceptions for repair garages for lighter-than-air fueled vehicles
  - Exception 1: Clarifies that nitrogen purging only involves the fuel tank, not the entire fuel system
  - Exception 2: Subassembly movement and removal permitted, provided work is limited to part exchange and no use of open flame or welding
  - Exception 3: Allows work on fuel system not including hydrogen storage tank

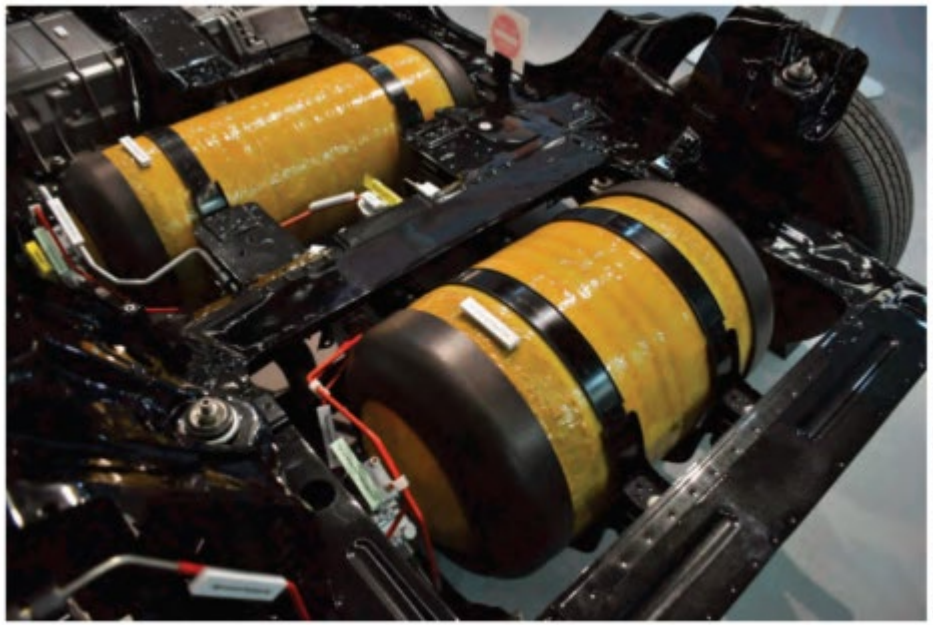

Photo courtesy of Tramino/iStock Unreleased/Getty Images

Where work is performed on the fuel system of lighter-than-air fueled vehicles, the repair garage must comply with the requirements in Section 2311.8.

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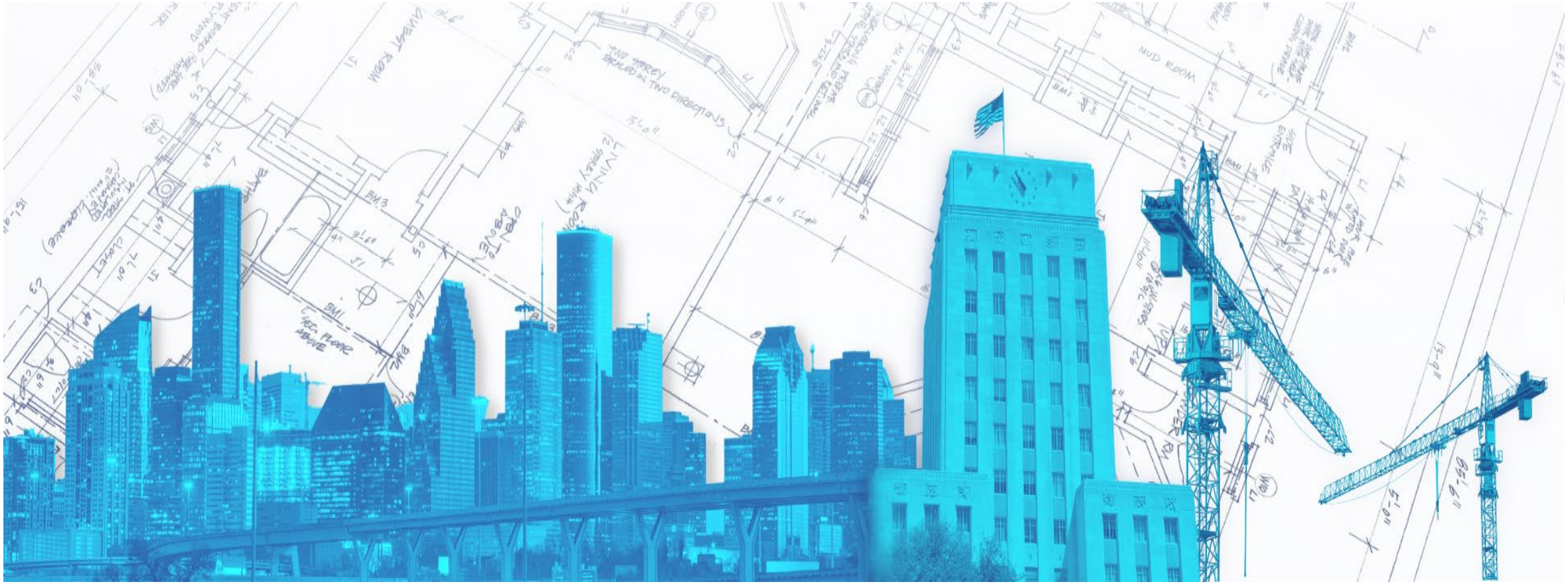
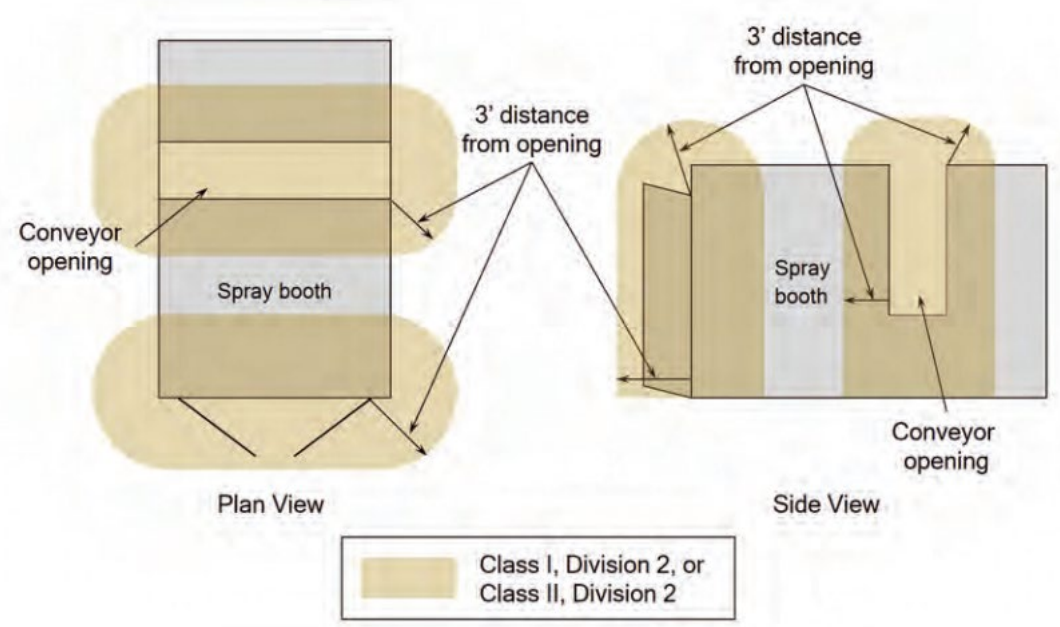
IFC CHAPTER 24 FLAMMABLE FINISHES



2018 IFC 2403.2.1.3: CLASSIFIED ELECTRICAL AREAS AROUND SPRAY BOOTHS

- Reduces size of the classified area around spray booth openings
  - Electrical wiring and equipment located within 5 feet ➔ 3 feet of openings in a spray booth to be a hazardous location



Classified electrical wiring and equipment is required within 3 feet of openings in spray booths.

2018 IFC 2404.2, 2404.3.1, 914.9, 202: SPRAY ROOMS AND SPRAY BOOTHS

- Revises requirements for spray booths and spray operations
  - Correlates between International Building Code and International Fire Code

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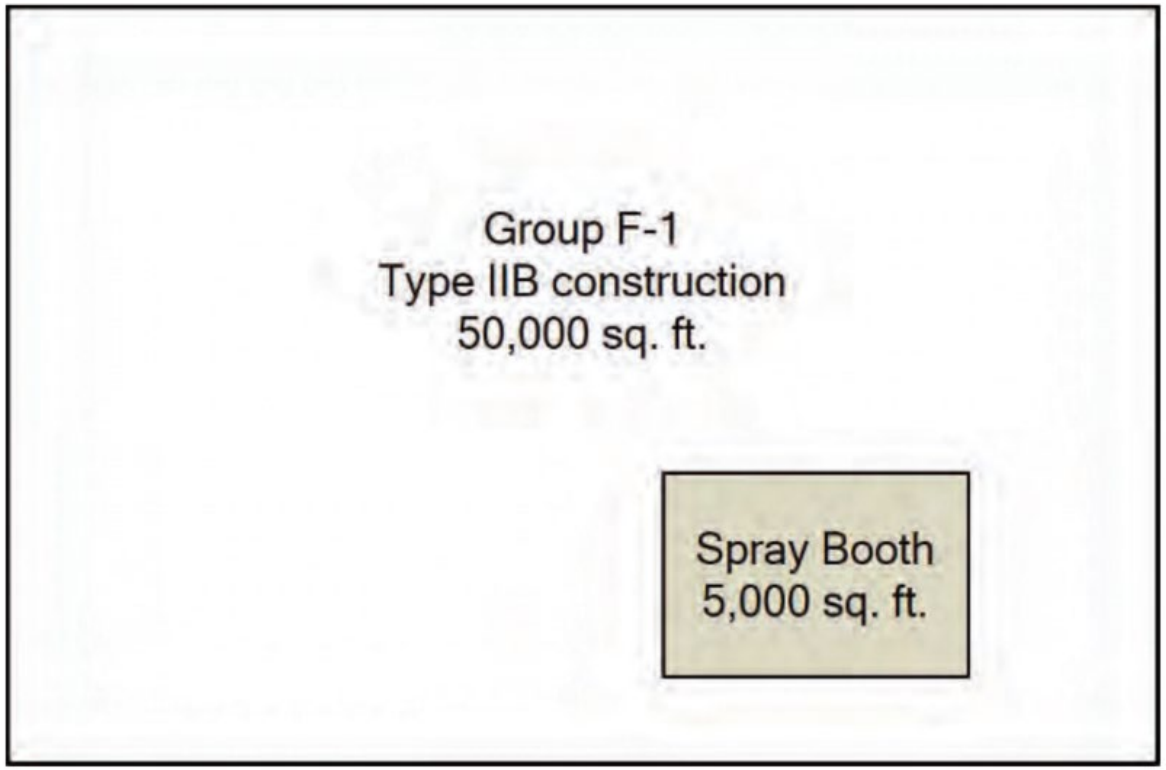
Construction of this spray booth is regulated by the *International Fire Code*.

2021 IFC 2404.3.3.6: SIZE OF SPRAY BOOTHS

- Removes restriction for aggregate spray booth areas
  - Area limited to 1,500 square feet ➔ no maximum value
    - Individual booths still not to exceed 500 square feet



IBC Table 506.2 limits the size of Type IIB construction for a Group H-2 occupancy to 7,000 square feet, so 10 percent of the building area becomes the limiting factor for this spray booth.

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IFC CHAPTER 27 SEMICONDUCTOR FABRICATION FACILITIES

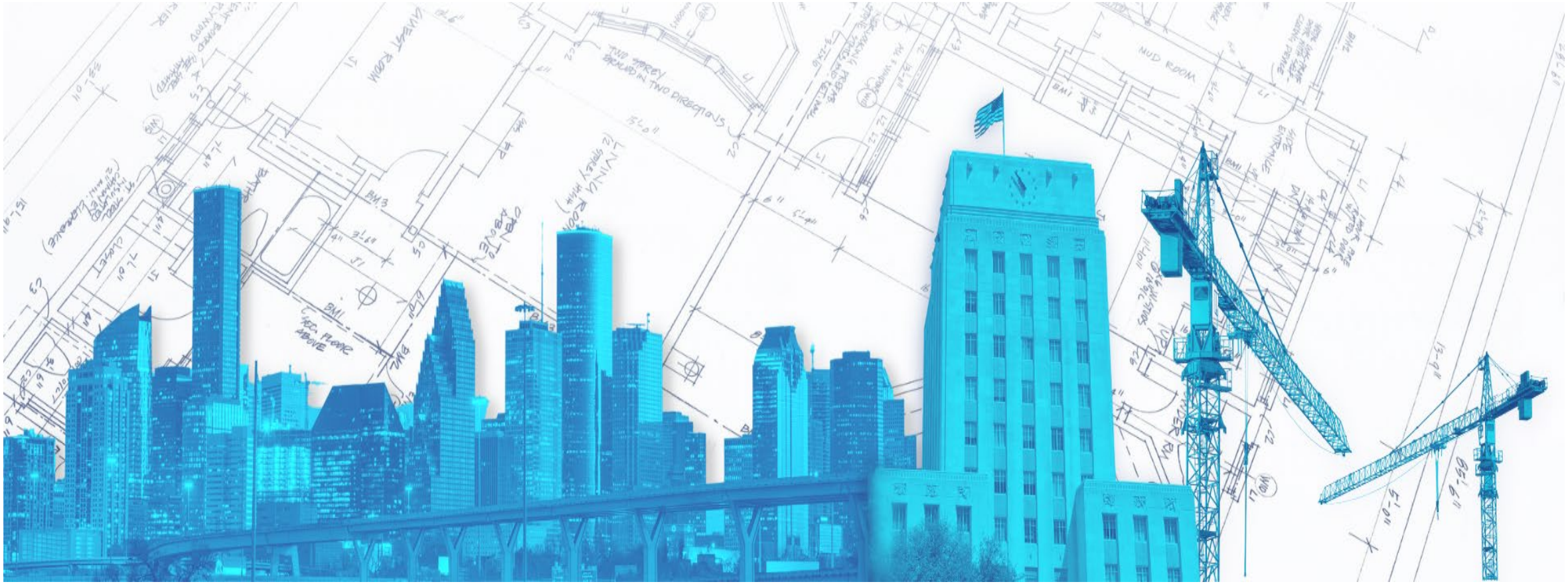
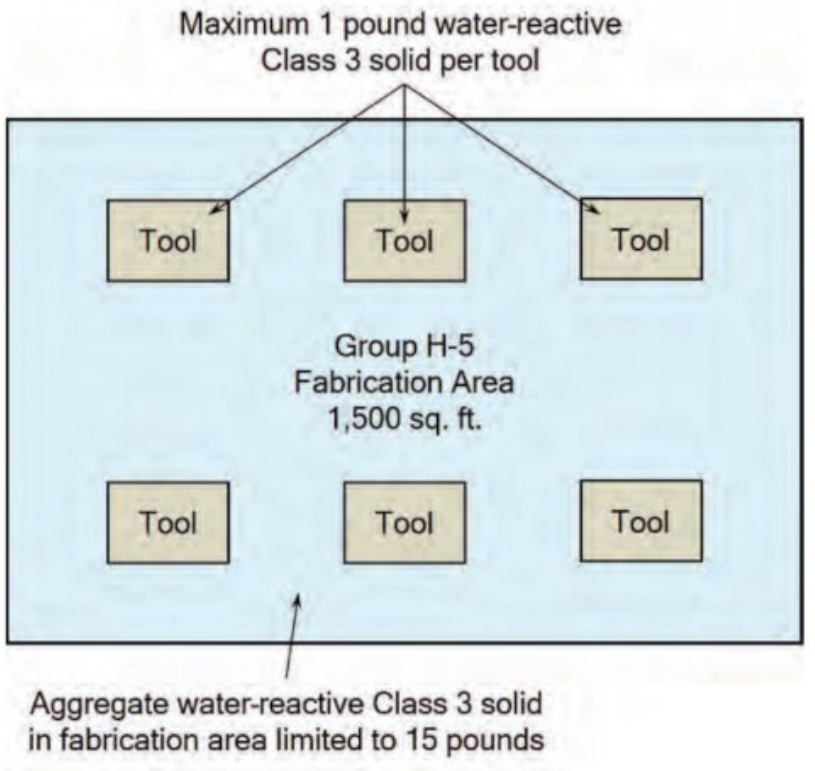


TABLE 2704.2.2.1: WATER-REACTIVE SOLIDS IN SEMICONDUCTOR FABS

- Increase of quantity limits for hazardous materials in a single fabrication area in group H-5
- Class 3 Water Reactive solids: Limit of 5 pounds ➔ 0.01 pounds per square foot
  - Footnote added: Maximum quantity in a single tool is 1 pound



The quantity of water-reactive Class 3 solid materials is limited at each tool and the aggregate is limited in each fabrication area.

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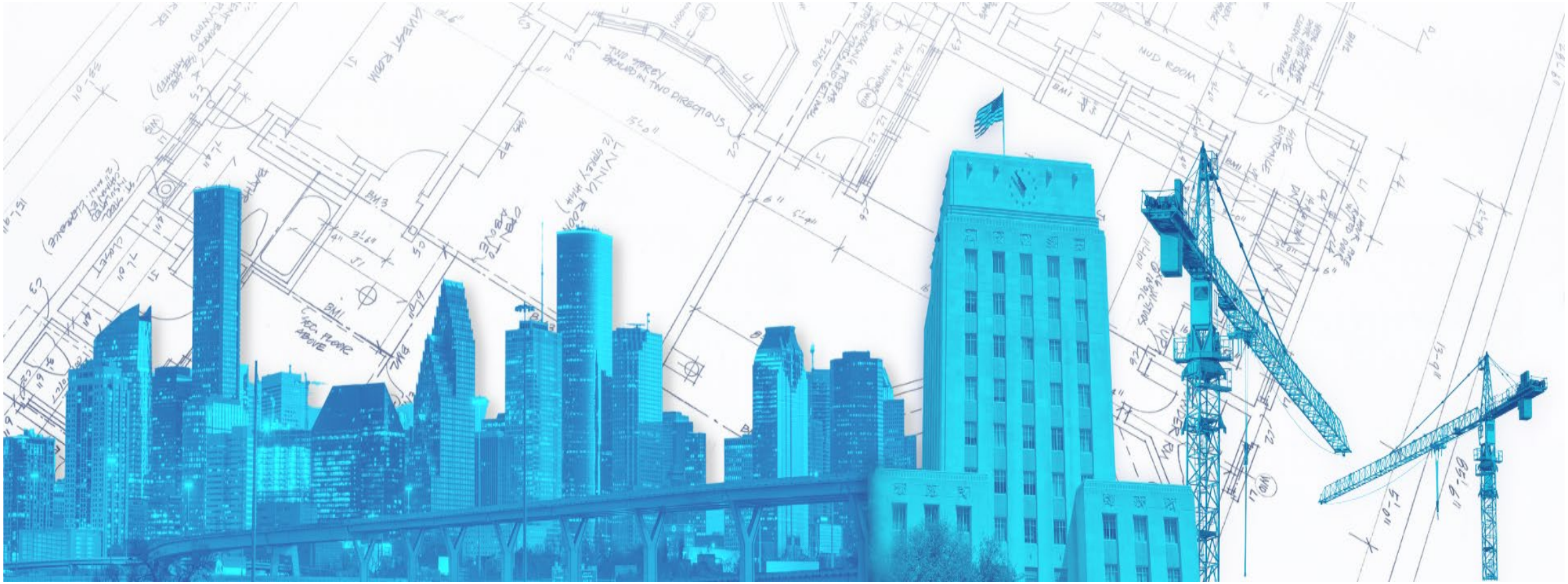
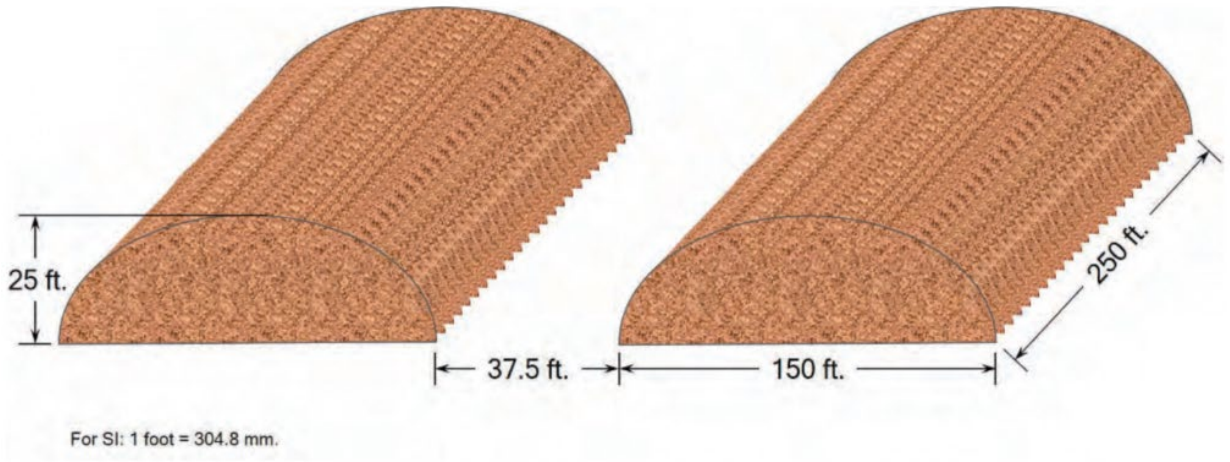
IFC CHAPTER 28 LUMBER YARDS AND AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES

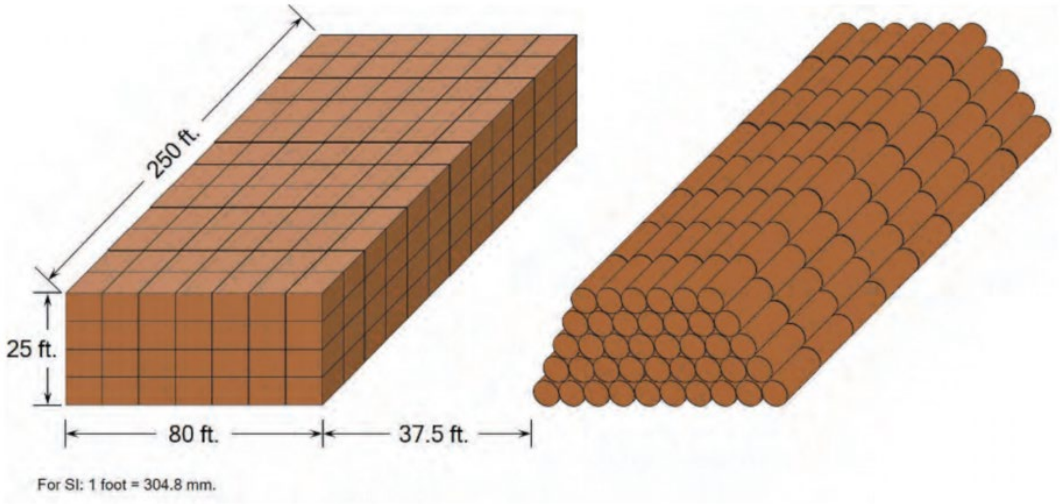


2021 IFC 2808.3, 2808.3.1, 2808.4: SIZES OF PILES AND STACKS

- Removes all allowed exceptions to pile size requirements
  - Increases are allowed with an approved fire protection plan that includes specific information listed in Section 2808.3.1
- Revises Pile and stacked product separation size requirements
  - Minimal separation must be 1.5 times the height of the pile



These piles of product are limited to 150 feet wide by 25 feet high unless an approved fire protection plan is provided.



This stacked product is limited to 80 feet wide by 25 feet high unless an approved fire protection plan is provided. The separation of piles is a minimum of 1½ times the height of storage.

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2018 IFC 2810: OUTDOOR STORAGE OF PALLETS AT PALLET MANUFACTURING AND RECYCLING FACILITIES

- New Section 2810: Outdoor Storage Of Pallets At Pallet Manufacturing And Recycling Facilities
  - Establishes limitations for pallet storage height and separations to property lines and buildings
  - Requires a fire safety and evacuation plan

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Pallet storage at pallet recycling facilities is limited to 20 feet in height. Separation to property line is 75 percent of the stack height but can be reduced based on additional fire protection features.

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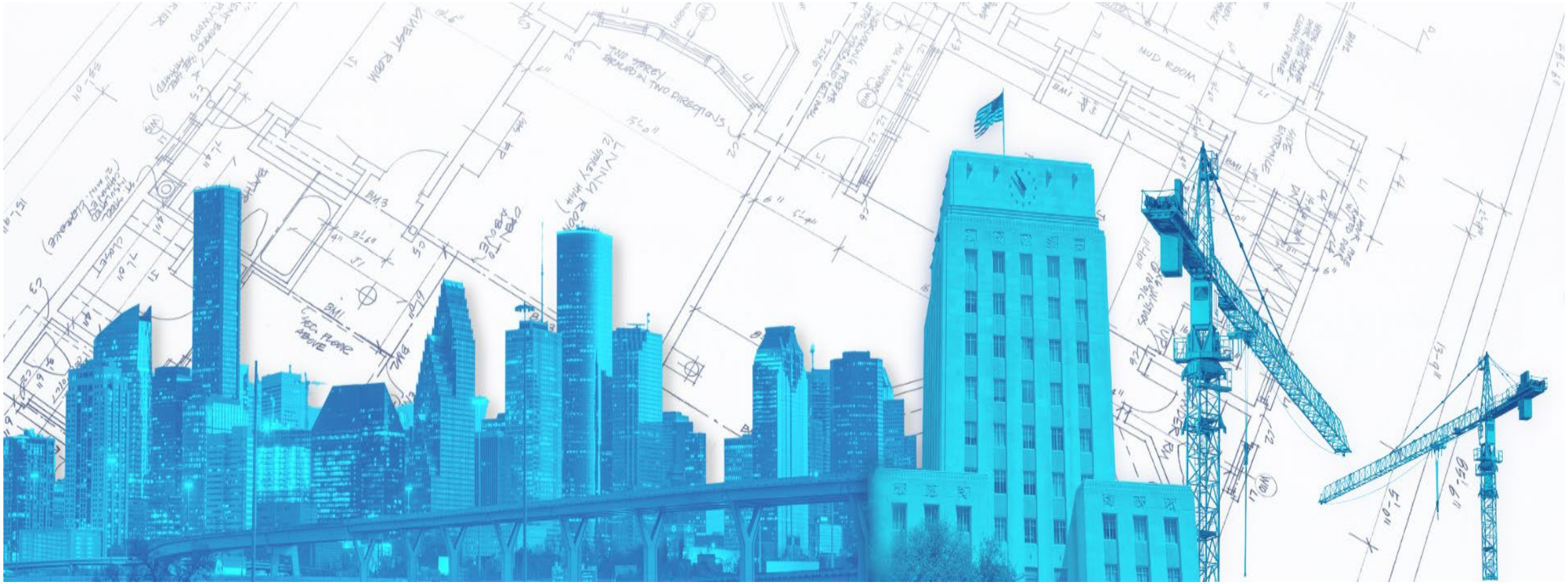
IFC CHAPTER 31 TENTS, TEMPORARY SPECIAL EVENT STRUCTURES AND OTHER MEMBRANE STRUCTURES



2018 IFC CHAPTER 31, 202: UMBRELLA STRUCTURES

- Revises definition of tent to include umbrella structures with area of 400+ square feet
- Defines umbrella structures

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This umbrella structure is regulated as a tent.

2018 IFC 3103.3.1: TENTS AND MEMBRANE STRUCTURES USED AS SPECIAL AMUSEMENT BUILDINGS

- New Section 3103.3.1: Special amusement building
  - Tents and other membrane structures erected as a special amusement building to have an automatic sprinkler system in accordance with Section 411.3 of the International Building Code

Photo courtesy of Ed Kaminski, Clark County Building and Fire Prevention Services

This special amusement building is located in a temporary membrane structure.

2018 IFC 3103.6, 3103.9: STRUCTURAL STABILITY OF TENTS

- Increases requirements for tents or membrane structures with an occupant load of 50 or more
  - Construction documents now require analysis of structural stability
- Certain tents and membrane structures now must comply with Sections 1606 through 1609 of the International Building Code
  - If greater than 7,500 square feet
  - If have occupant load greater than 1,000

Photo courtesy of Assistant Fire Marshal Fulton Cochran, Clark County Department of Building and Fire Prevention

This large tent, with a floor area over 7,500 square feet, must provide an analysis of its structural integrity.

2018 IFC 3104.2: FABRICS FOR TENTS AND MEMBRANE STRUCTURES

- Clarifies the application of testing criteria for the flame spread of tent and membrane structures
  - Indicates which test method to be used from NFPA 701
  - Removes reference to testing sawdust

Photo courtesy of Assistant Fire Marshal Fulton Cochran, Clark County Department of Building and Fire Prevention

The tent fabric must be tested in accordance with Test Method 2 of NFPA 701.

2018 IFC 3105, 105.6.47, 105.7.22, 202: TEMPORARY SPECIAL EVENT STRUCTURES

- Expands requirements for temporary stage structures
  - Temporary stage canopy ➔ Temporary special event structure
  - Now includes all temporary structures greater than 400 square feet when used at special events.
  - Requires a single construction permit to erect and take down temporary special event structures
  - Requires fire extinguisher at or near all special event structures

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This special event is conducted under a temporary special event structure.

2018 IFC 3106: OUTDOOR ASSEMBLY EVENTS

- New Section 3106: Outdoor Assembly Events
  - Establishes definition for outdoor assembly event
  - Requires operational permit when occupant load exceeds 1,000
  - Safety requirements for concession stands and food booths

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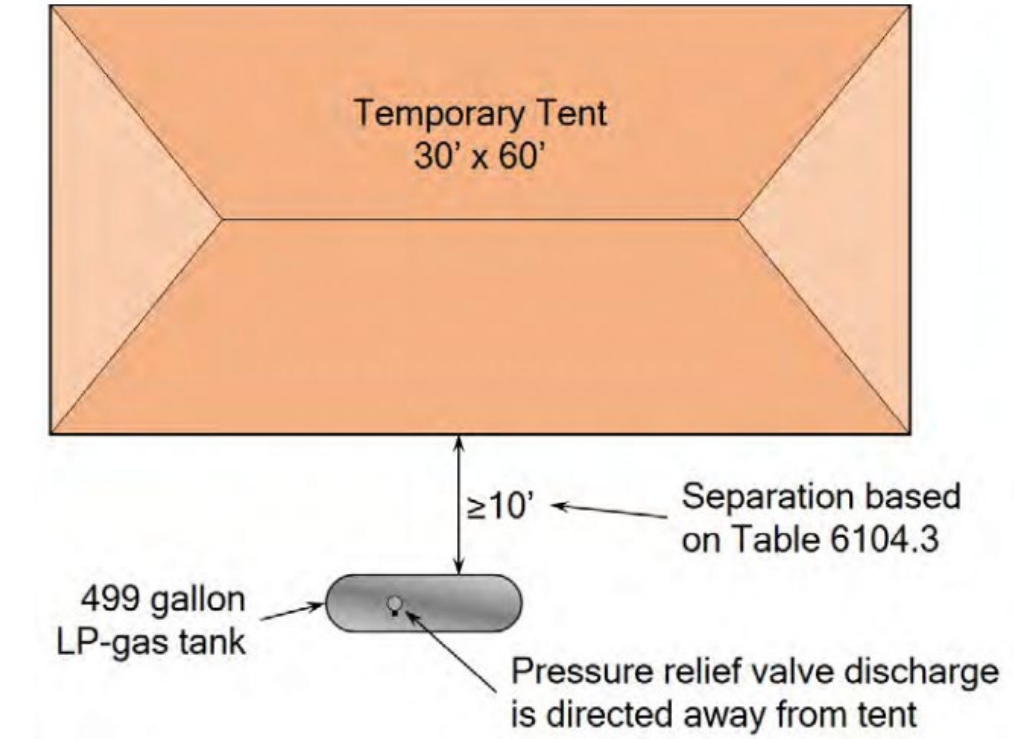
An outdoor event where vehicular access and access to fire protection equipment is impeded.

2018 IFC 3107.13: LP-GAS CONTAINERS AND TANKS ADJACENT TO TENTS AND MEMBRANE STRUCTURES

- Revises requirements for use and separation of LP-gas containers in and around tents and membrane structures
  - Section 3104 ➔ Section 3107
  - Addresses LP-gas containers outside of buildings



LP-gas storage tank separated from a tent or membrane structure.

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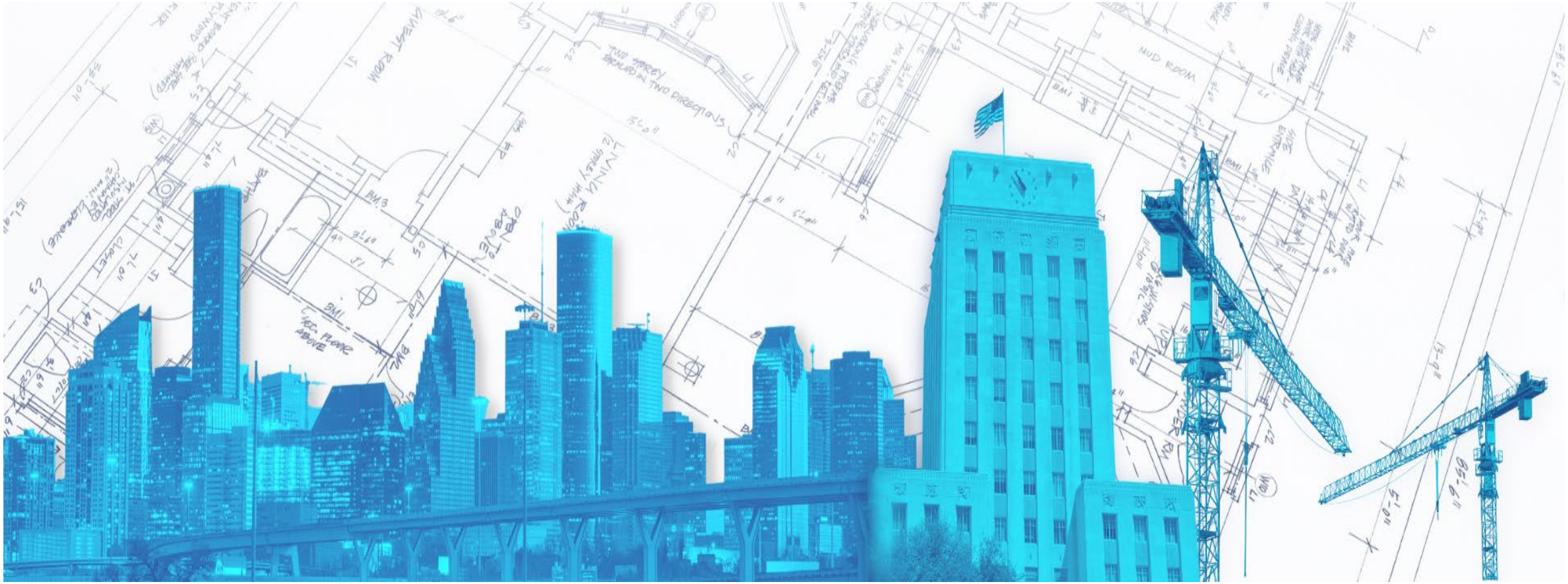
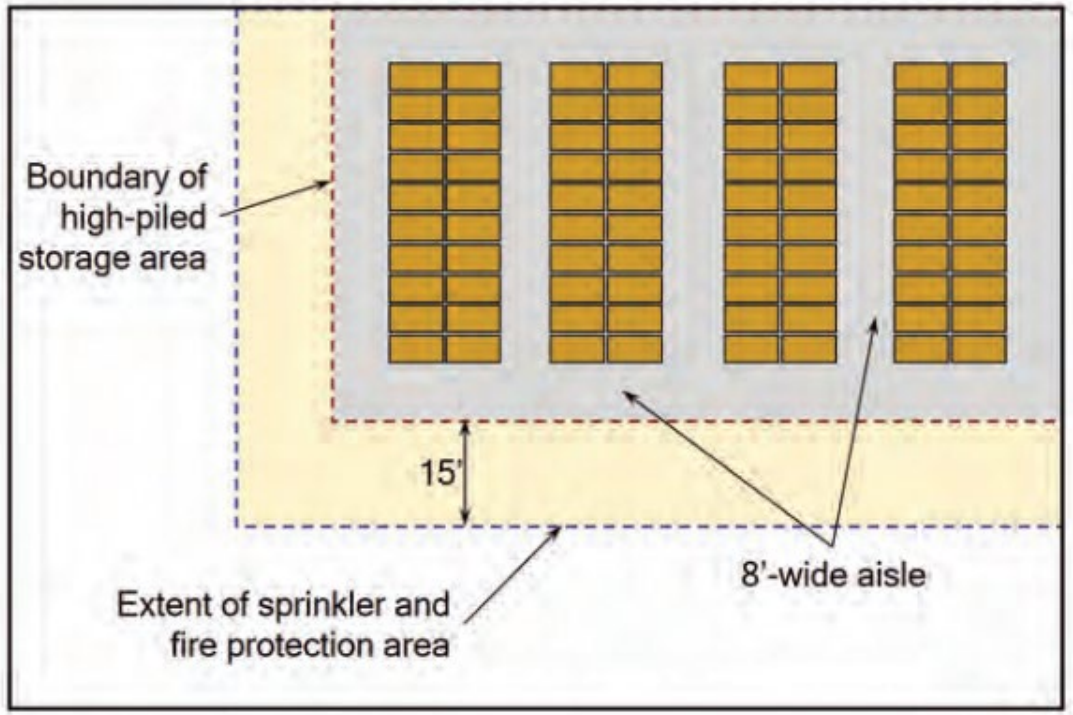
IFC CHAPTER 32 HIGH-PILED COMBUSTIBLE STORAGE



2018 IFC CHAPTER 32: HIGH-PILED COMBUSTIBLE STORAGE

- Revises entire section
  - Now correlates with current NFPA 13 requirements and recent FM Global fire tests



When determining the size of the high-piled combustible storage area, include a perimeter aisle or the distance to a wall, whichever is less.

2021 IFC TABLE 3203.8: HIGH-PILED STORAGE OF LITHIUM-ION BATTERIES

- Examples of Commodity Classification Table now includes lithium-ion batteries
  - High-piled storage of lithium-ion batteries designated high-hazard

Photo courtesy of Coprid/iStock / Getty Images Plus/ Getty Images

Lithium-ion batteries present a high fire hazard.

2021 IFC 3205.5: AISLE MAINTENANCE IN HIGH-PILED STORAGE

- Aisle maintenance exception: limited displays now allowed within aisles
  - Allowed for rack storage with automatic sprinkler systems
  - Displays and wing stacks up to 48 inches tall permitted
  - Not permitted where egress is obstructed (48 inches wide)

Limited displays in the aisles cannot exceed 48 inches in height and must not obstruct a minimum of 48-inch egress path.

2021 IFC 3209.4, 3209.4.1, 3209.4.2: SHUTDOWN OF AUTOMATED RACK STORAGE

- Manual shutdown switch required for all automatic rack high-piled storage
- Automatic shutdown required for automatic rack high-piled storage areas greater than 500 square feet
  - Must activate upon waterflow or fire detection system if present

Photo courtesy of SKapl//iStock / Getty Images Plus/ Getty Images

Automated product handling in a rack storage warehouse.

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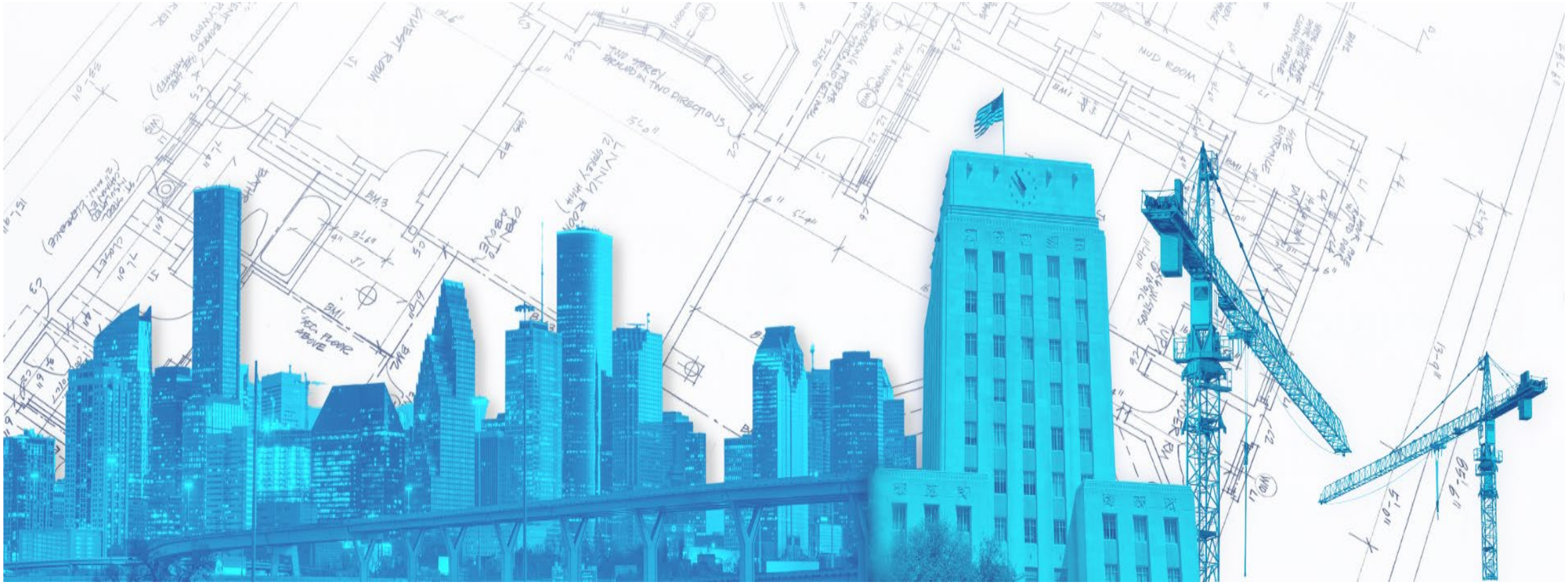
IFC CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION



2021 IFC 3303.3, 3303.3.1: DAILY FIRE SAFETY INSPECTION

- Site safety director now responsible for daily fire safety inspection at project site under construction
  - Failure to document results in violation
  - After the third violation a stop work order can be issued

Daily fire safety inspections are required to address hazards that exist during building construction.

2021 IFC 3303.5: FIRE SAFETY FOR TYPES IV-A, IV-B AND IV-C CONSTRUCTION

- Passive safety requirements for Type IV-A, IV-B, and IV-C construction for 6+ stories above grade:
  - Standpipes provided
  - Water supply for fire department operations
  - Where noncombustible protection is required, the protection must be installed on all building elements 4+ levels below construction before additional floor levels can be erected.
    - Exception of shafts/vertical exit enclosures
  - Required exterior wall coverings must be installed on all floor levels, 4+ levels below active mass timber construction before erecting additional floor level can be erected.
    - Exception of shafts/vertical exit enclosures

2018 IFC 3304.5, 3308, 3309.1: FIRE WATCH DURING CONSTRUCTION AND DEMOLITION

- Increases fire watch requirements
  - Required during nonworking hours for new construction above 40 feet
- Clarifies functions and duties of fire watch personnel
  - Establishes requirements for records, fire prevention programs, training, and communications of fire watch
  - Allows fire watch personnel to also provide security duties

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The fire code official is authorized to require fire watch for this construction project which exceeds 40 feet in height above the lowest adjacent grade.

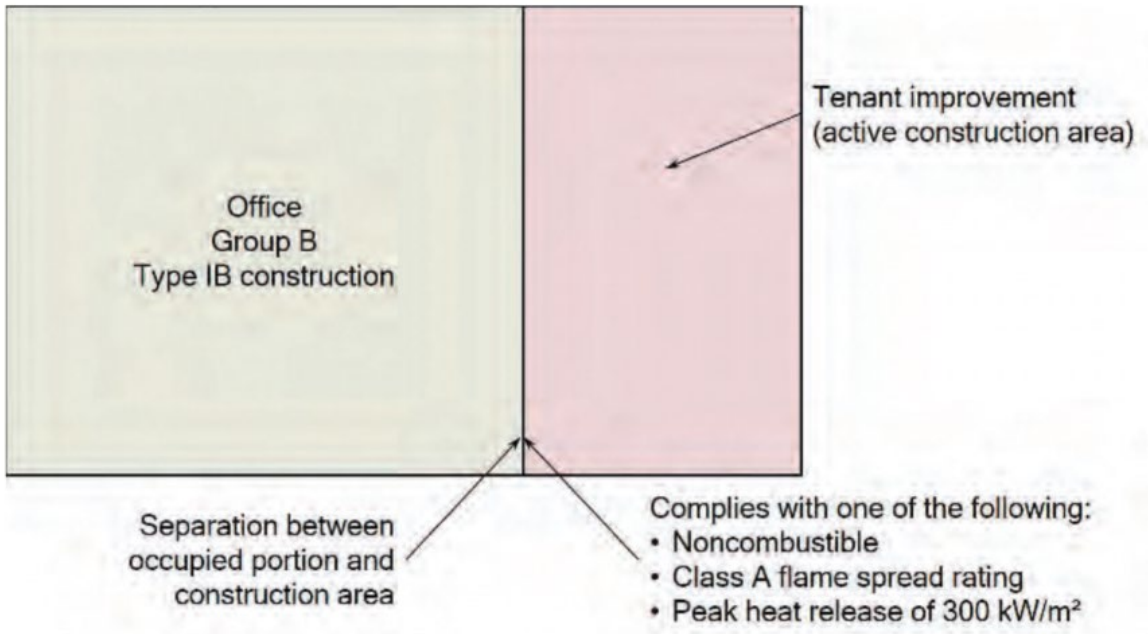
2021 IFC 3305.5: FIRE WATCH

- Refines requirements for fire watch
  - Fire watch required when a building is 40+ feet tall or construction of a multiple story building is 50,000+ square feet per floor
  - Details fire watch duties, training, means of notification, location, and records

Fire watch is required for new construction exceeding 40 feet above the lowest adjacent grade.

2021 IFC 3305.9: SEPARATION OF CONSTRUCTION AREAS

- Barriers in Type I and Type II construction used to separate construction areas from occupied portions must be either:
  - Noncombustible
  - Flame retardant
  - Have a limited heat release rate



Where a separation is provided between construction areas and occupied areas it must meet minimum flammability requirements in Type I or II buildings.

2021 IFC 3313: WATER SUPPLY DURING CONSTRUCTION

- Minimum water supply during construction must be provided:
  - On the commencement of vertical combustible construction and on the installation of a standpipe system
    - Exception: fire code official authorized to reduce where full flow is impractical
  - When combustible materials are delivered to site
  - For Type III, IV, and V buildings
- Minimum water supply must provide minimum flow of 500 gpm

Water supply is not required during construction of the lower portion of this building since it is Type I construction, but when combustible building materials arrive on site for the upper floors, water supply is required.

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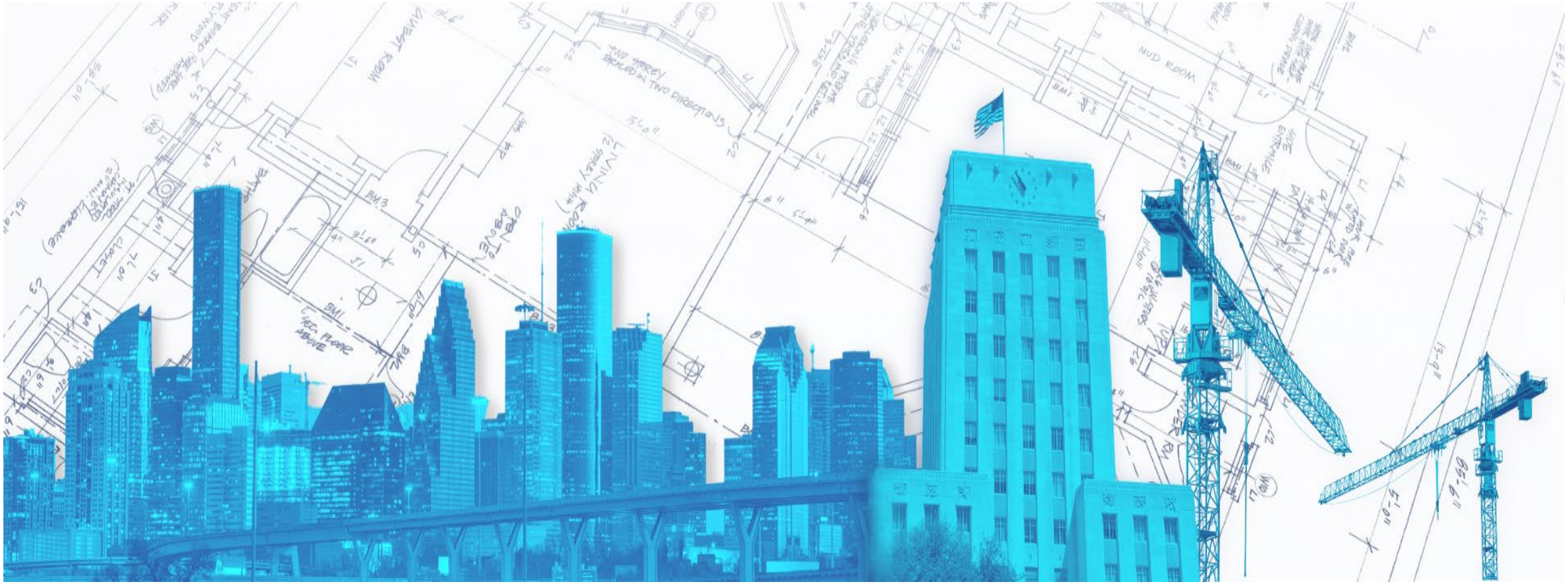
IFC CHAPTER 38 HIGHER EDUCATION LABORATORIES



2018 IFC CHAPTER 38, SECTION 202: HIGHER EDUCATION LABORATORIES

- Section 202: Defines higher education laboratory
- New Chapter 38: Higher Education Laboratories
  - Increases general laboratory safety requirements
  - Increases maximum allowable quantity in large or multistory laboratories or laboratories located in multistory buildings
  - Allows very small quantities of currently prohibited hazardous materials in non-sprinklered laboratory buildings.
  - Introduces the concept of a laboratory suite

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Laboratories at colleges and universities are specifically regulated in Chapter 38.

2021 IFC 3805.2.1, 3805.2.2, 3805.4, TABLE 3805.4: RESTRICTED MATERIALS IN COLLEGE LABS

- Limits use and storage of oxidizer Class 4 in college labs
  - The percentage of maximum allowable quantity per control area in Table 3805.4 to be 25%
  - Applies to Table 5003.1.1(1) limits for Class 4 Oxidizers or pyrophoric materials

College and university labs are limited in the quantities of pyrophoric and oxidizer Class 4 materials.

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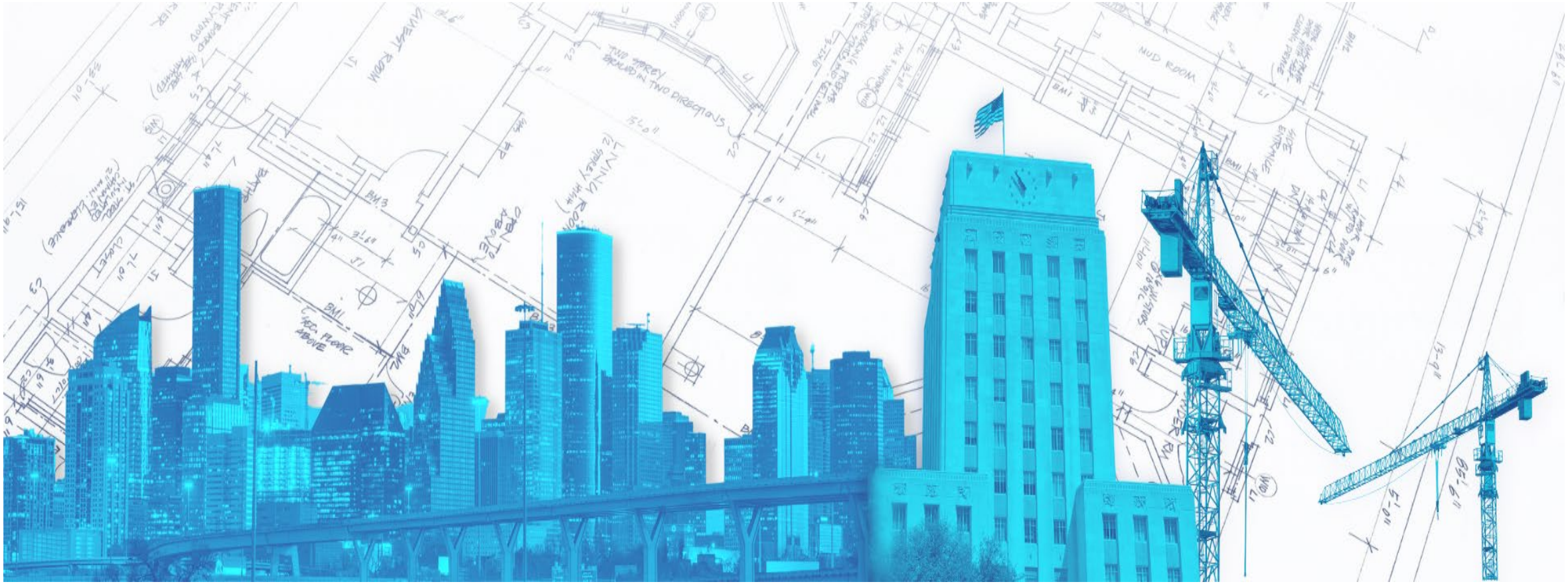
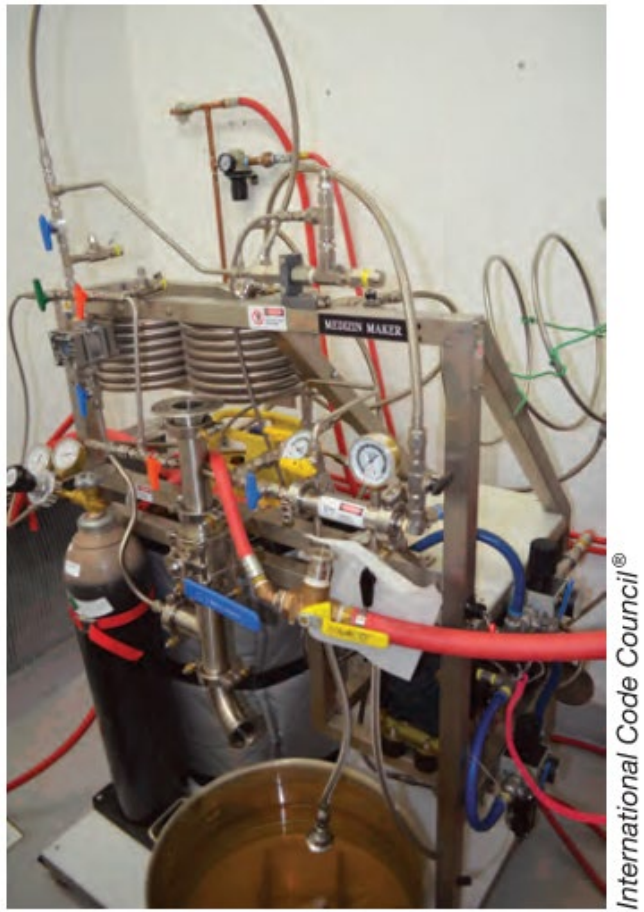
IFC CHAPTER 39 PROCESSING AND EXTRACTION FACILITIES



2018 IFC CHAPTER 39: PROCESSING AND EXTRACTION FACILITIES

- New Chapter 39: Processing and Extraction Facilities
  - Requires operational and construction permits for oil extraction from plant materials using solvents as the medium
  - Establishes definitions for and regulates “miscella” and “desolventizing process”
  - Requires all equipment for the oil extraction process to be listed or approved



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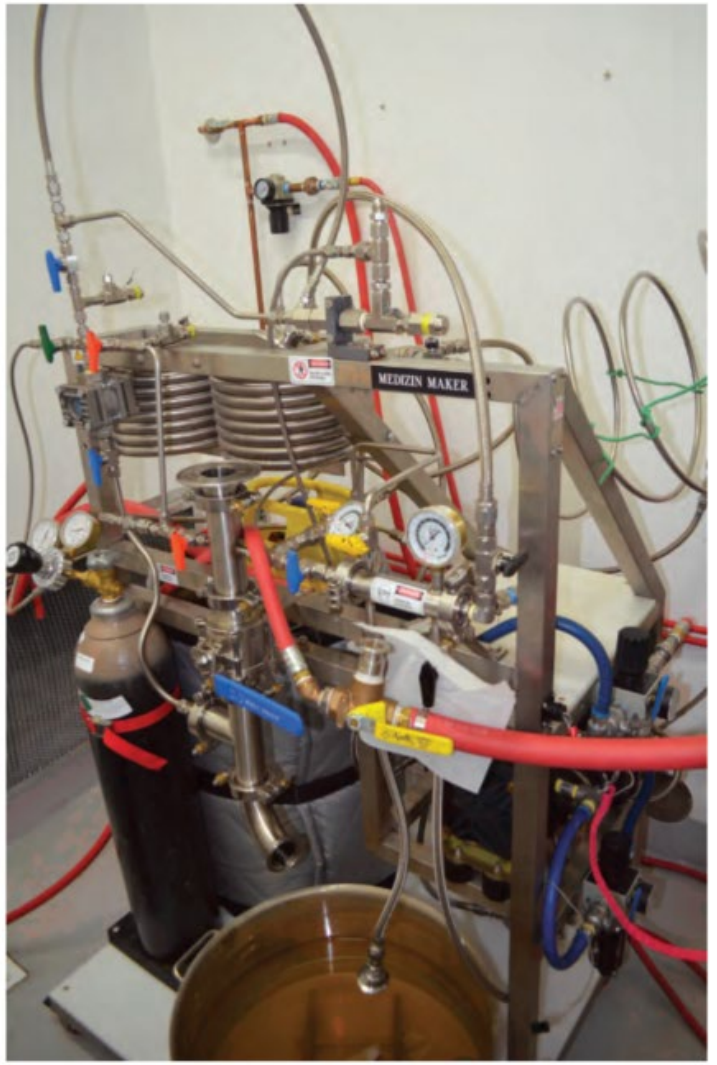
The extraction process can use flammable gas, flammable liquids, or combustible liquids as the media for oil extraction.

2021 IFC 3904.2, 3904.2.1, 3904.2.2: EXTRACTION EQUIPMENT

- Revises requirements for systems and equipment used for the extraction of oils from plant material
  - Now references UL 1389: systems and equipment must be listed and labeled accordingly
  - If not listed, must be approved for specific use by a registered design professional, and a technical report submitted to the fire code official



This plant oil extraction unit was not listed so a technical report was required to evaluate the safe operation of the equipment.

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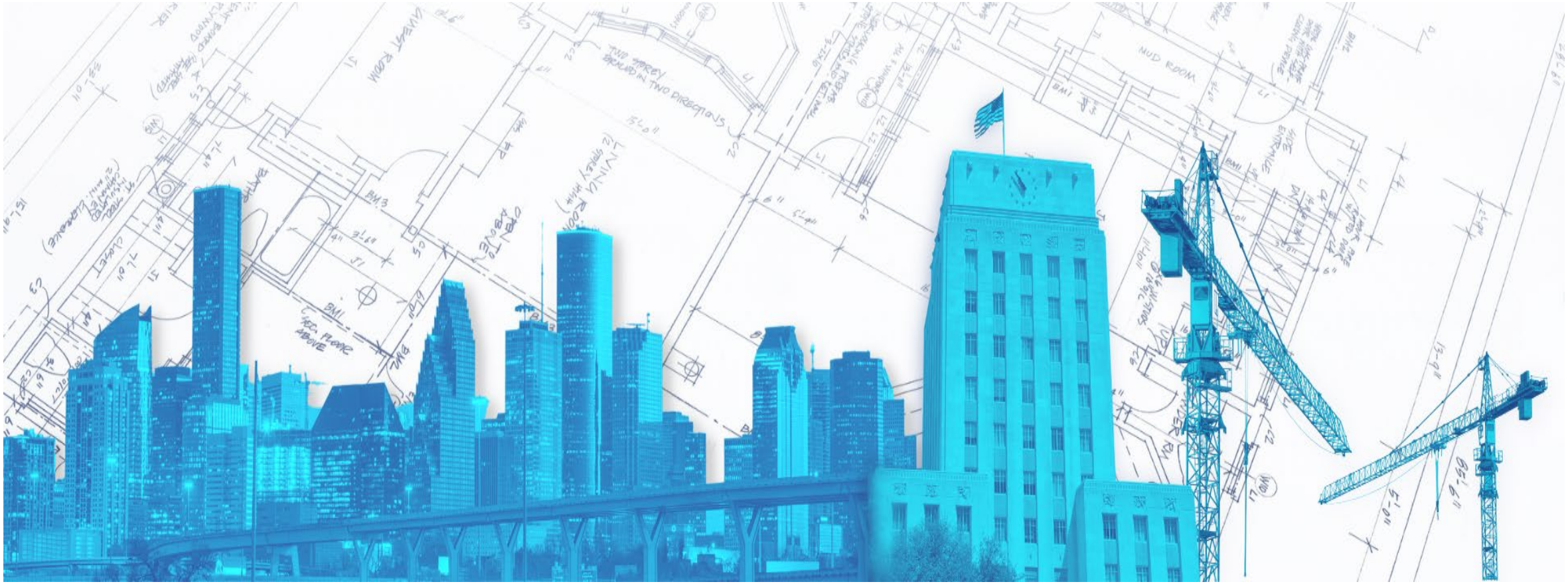
IFC CHAPTER 40 STORAGE OF DISTILLED SPIRITS AND WINES



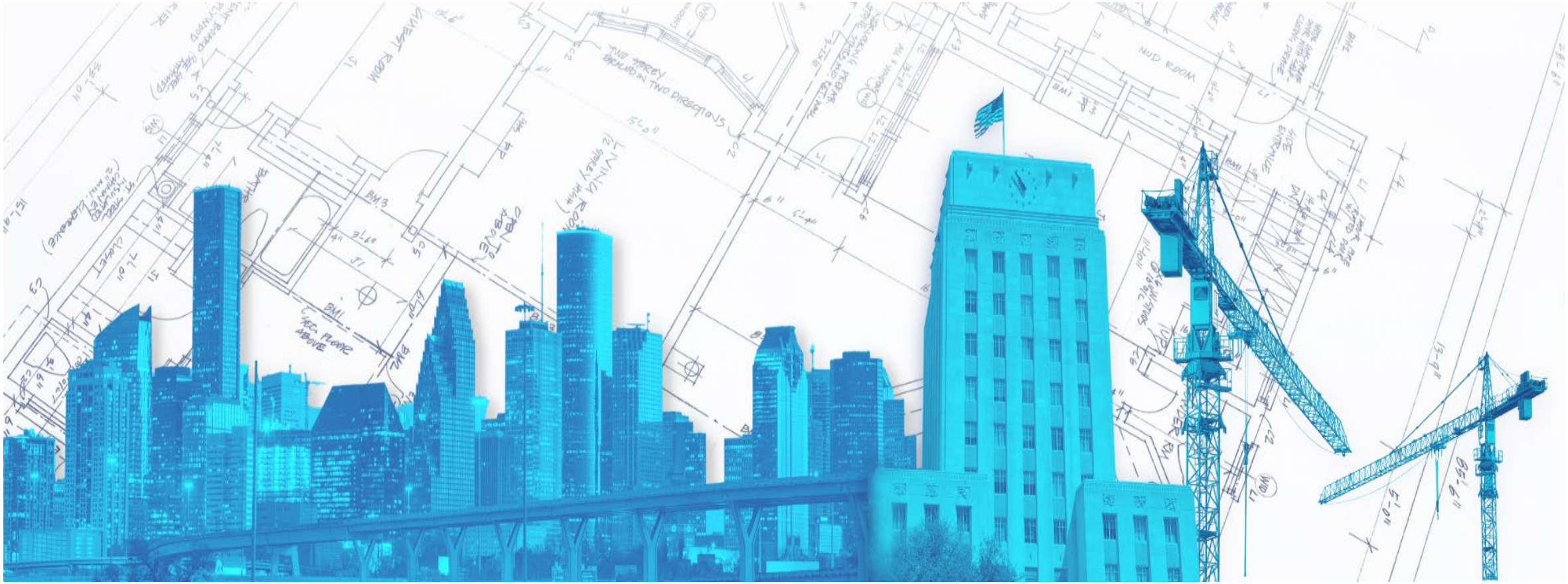
2021 IFC CHAPTER 40, 903.2.4.2, 903.2.9.3, IBC 307.1.1: STORAGE OF DISTILLED SPIRITS AND WINES:

- New Chapter 40: Establishes requirements for storage of distilled spirits and wines in barrels and casks
- Chapter 9: Requires automatic sprinkler system in Group F-1 or S-1 involving bulk storage of distilled spirits or wine
- IBC 307.1.1: Removes certain hazardous materials from being designated Group H occupancy type:
  - Distilling or brewing beverages
  - Storage of beer, distilled spirits, and wines in barrels and casks

Photo courtesy of Piotr_roae/iStock/Getty Images Plus/Getty Images

Storage of distilled spirits and wines is now regulated by Chapter 40.

IFC CHAPTER 50 HAZARDOUS MATERIALS—GENERAL PROVISIONS



2021 IFC 5001.1, 5701.2, 202: HAZARDOUS MATERIAL EXEMPTIONS

- Section 202: Modifies definition of “combustible liquids” and “flammable liquids”
  - Both exclude liquids without fire point when tested
- Correlates exceptions in Chapters 50 and 57
  - Section 5001.1: Adds exceptions to scope
  - Section 5701.2: Adds sections of nonapplicable items

Some paint products have a flash point, but no fire point and are therefore not regulated as hazardous materials. Other products, like the paint thinner and acetone, have a fire point and are classified as flammable or combustible liquids and a hazardous material.

2018 IFC TABLE 5003.1.1(1): CONSUMER FIREWORKS

- Addresses hazards associated with Division 1.4G explosives
  - Reclassifies consumer fireworks from its own category into explosives
  - Removes allowable area increase of storage for fireworks in a sprinklered building

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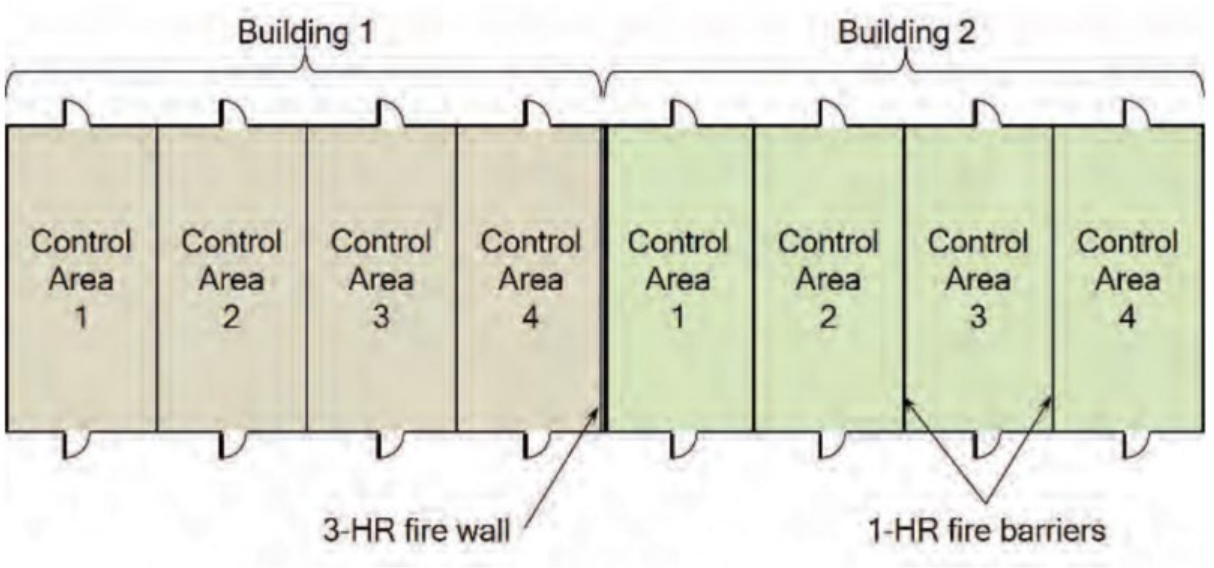
These fireworks are classified as explosives, 1.4G and would not receive quantity increase based on fire sprinklers in the building.

2018 IFC 5003.1.1(1), 5003.11.1, 6303.1.1.2: MAXIMUM ALLOWABLE QUANTITY FOR CLASS 3 OXIDIZERS

- Increases maximum allowable quantity for Class 3 oxidizers in control areas and Groups M and S occupancies
  - Maintenance, operation, or sanitation in control areas: maximum 200 ➔ 220 pounds of solid or 20 ➔ 22 gallons of liquid class 3 oxidizers
  - Maximum allowable quantity per indoor and outdoor control area in group M and S occupancies: Maximum 1,105 ➔ 1,350 pounds of solid or 115 ➔ 135 gallons of liquid class 3 oxidizers

2021 IFC 5003.8.3.3: NUMBER OF CONTROL AREAS

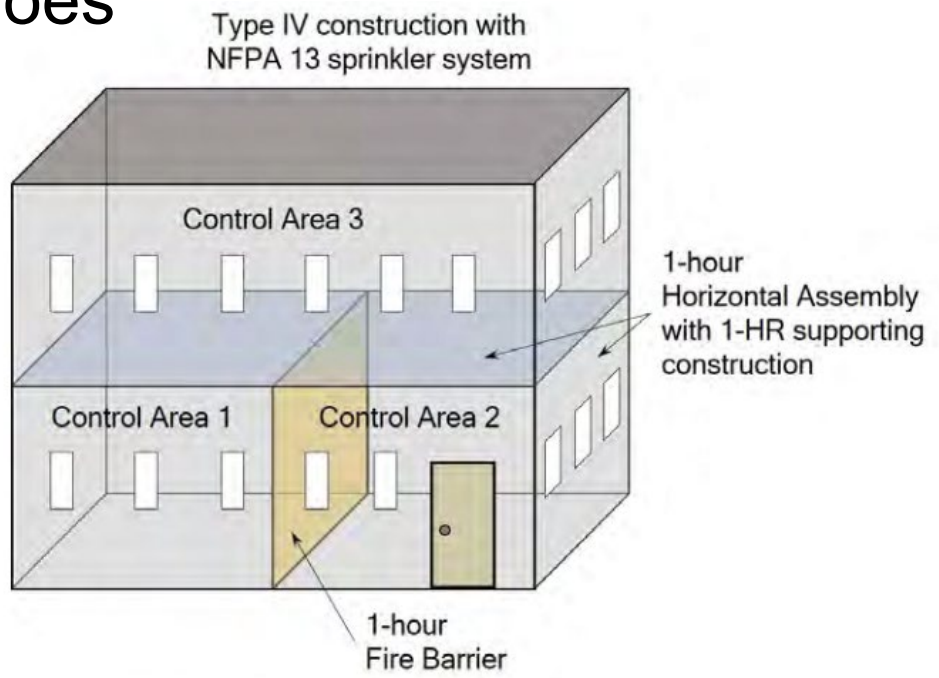
- Modification to the process of evaluation of the number of control areas
  - Building portions separated by fire walls can be considered separate buildings



Portions of a building separated by a fire wall are considered separate buildings which allows the number of control areas on each side of the fire wall to be the maximum allowed per building. Table 5003.8.3.2 allows four control areas per floor on the first floor. Therefore, this single story facility can have a maximum of eight control areas.

2018 IFC 5003.8.3.4: CONSTRUCTION OF CONTROL AREAS

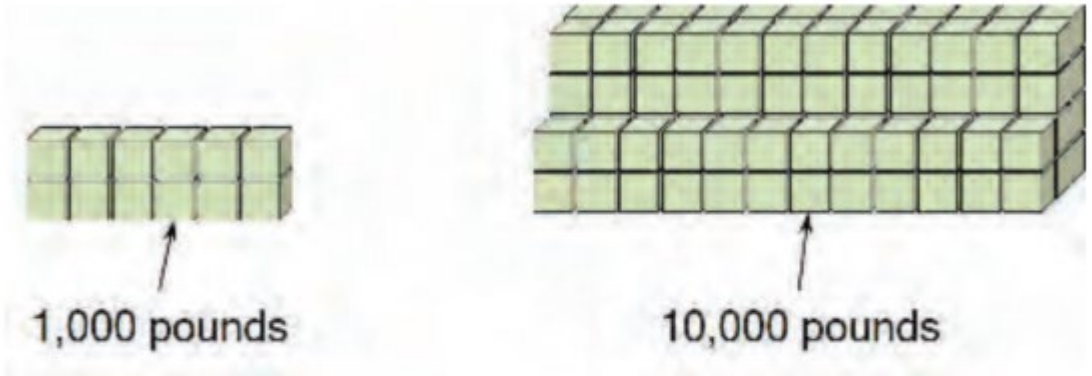
- Allows reduction of the fire-resistance rating of a control floor in a Type IV building
  - Can be reduced from 2-hour to 1-hour if the building is sprinklered and does not exceed 3 stories



The floor of Control Area 3 in this building of Type IV construction can be 1-hour construction when the building has an automatic sprinkler system.

2021 IFC TABLE 5003.11.1: TOXIC SOLIDS IN RETAIL OCCUPANCIES

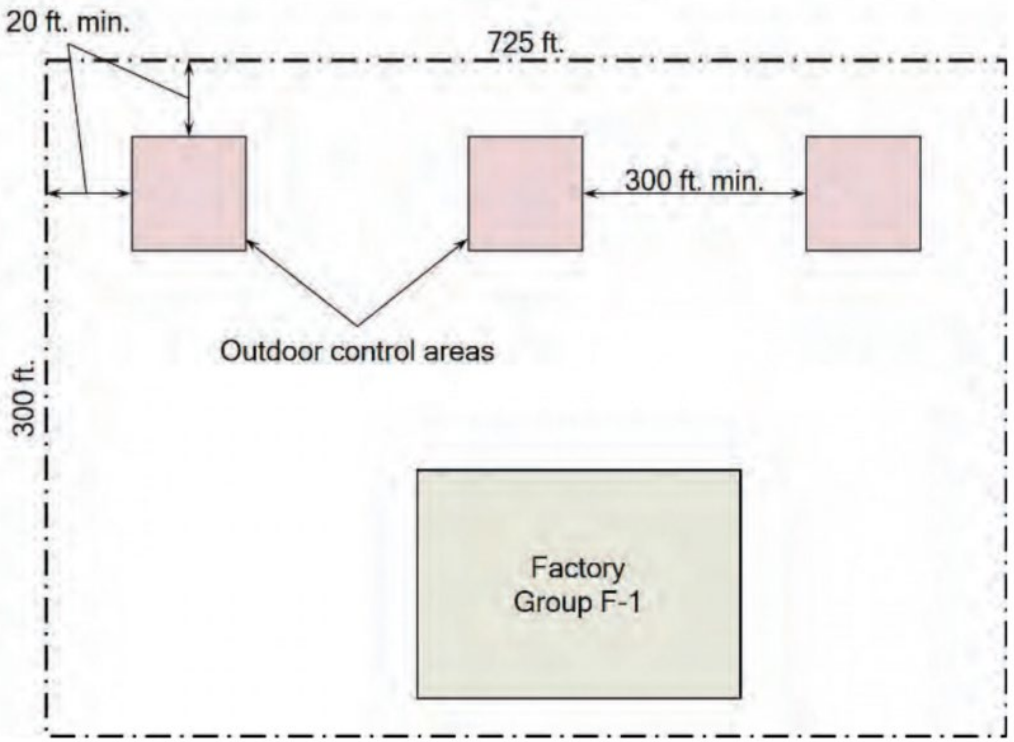
- Maximum allowable quantity of solid toxic material
  - Allowable quantity unchanged; footnote added to maximum value
  - Permitted to increase in retail and storage facilities if the toxic classification is based solely on the LC50
    - Several conditions apply



The quantity of solid toxic materials receives ten times increase if the only hazard is the LC_{50} based on the inhalation hazard.

2021 IFC 5003.12, 5004.14, 5005.3.3, 5005.4.3: OUTDOOR CONTROL AREAS

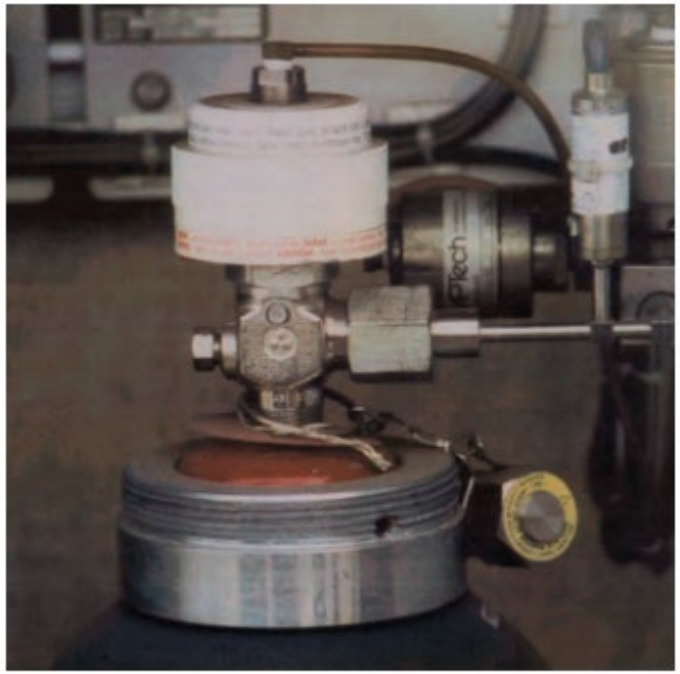
- Section 5003.12: Removes redundant language regarding exceeding quantities of hazardous materials
  - Maximum allowable quantity values still apply
- Sections 5004 and 5005: Added reference to 5003.12 requirements for outdoor location



Quantities of hazardous materials in outdoor control areas can exceed the maximum allowable quantity when other code sections or referenced standards contain requirements for outdoor storage and use that are specific to the material.

2018 IFC 5005.1.12: PROTECTION OF HAZARDOUS MATERIALS PIPING SYSTEMS

- Revised requirements for leak detection and emergency shutoff for high hazard gases and liquids
  - Changes regarding gases or liquids with hazard ranking of Health Class 3 or 4, Flammability Class 4 or Instability Class 3 or 4 and carried in pressurized piping above 15 pounds psig
  - Moved: Section 5003 ➔ Section 5005
    - Now applies only when maximum allowable quantity per control area is exceeded



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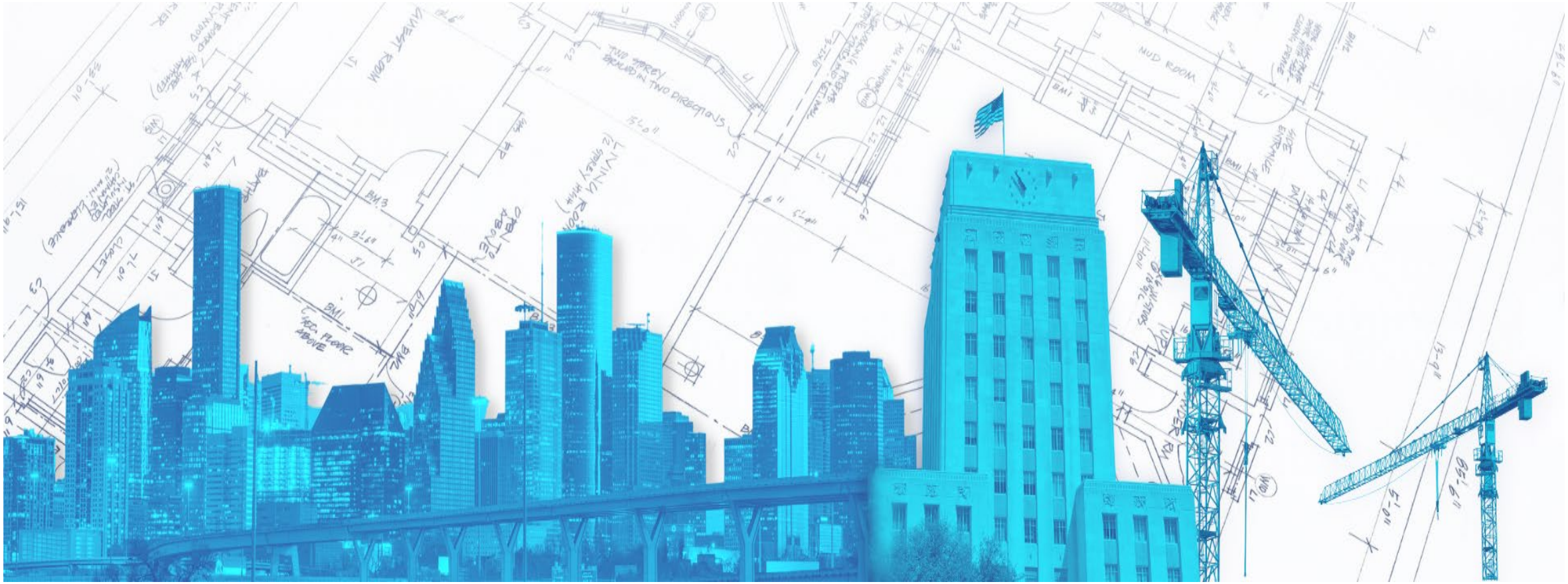
Pneumatically operated shutoff valve on a gas cylinder.

IFC CHAPTER 51 AEROSOLS



2018 IFC 5103.2, 5104.1.2: AEROSOL PRODUCTS IN PLASTIC CONTAINERS

- Revises requirements for aerosol products in plastic containers
  - Details requirements for labeling based on container size
- Prohibits the use of Plastic Aerosol X products in higher life hazard occupancies

2018 IFC 5103.2.2, 5104.2.2, 5104.3.3, 5104.8, 5106.2.2, 202: AEROSOL COOKING SPRAY PRODUCTS

- Section 202: Defines aerosol cooking spray products
  - Products with a chemical heat of combustion greater than 8600 Btu/lb. and contain no more than 18 percent by weight of flammable propellant
- Sections 5103, 5104, 5106: Specifies fire protection requirements
  - Product storage in A, B, E, F, and R occupancies limited to 1,000 pounds
  - Solid pile, palletized, or rack storage in general purpose warehouse limited to 2,500 pounds
    - Unless protected in accordance with NFPA 30B
  - Storage and handling of products references NFPA 30B

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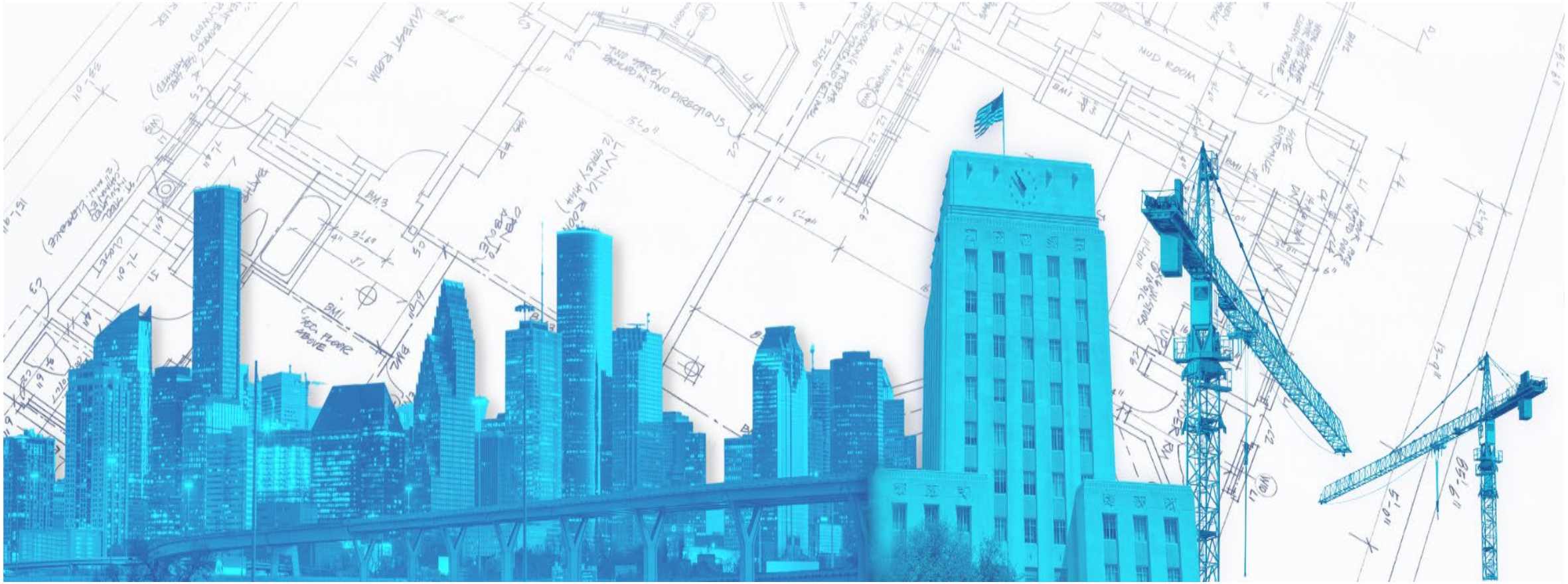
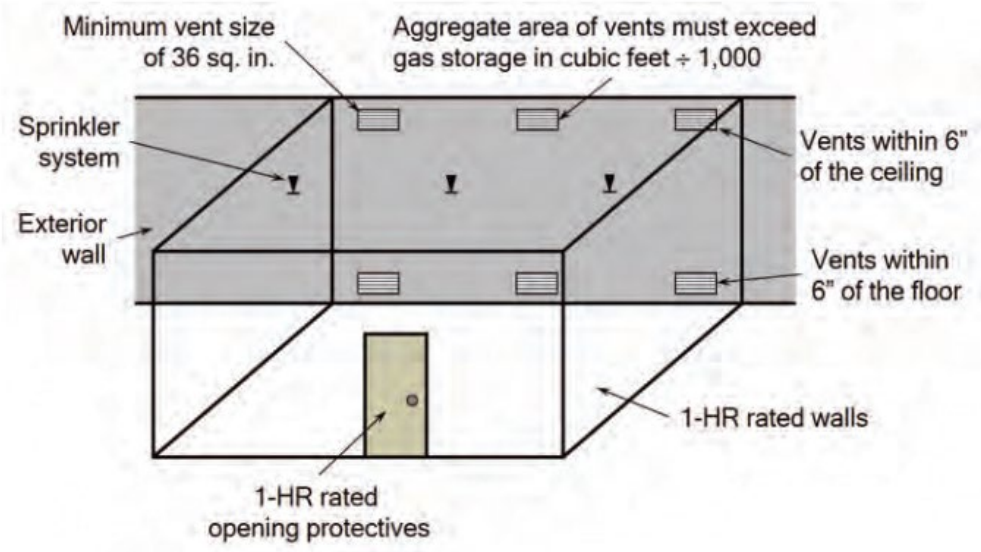
IFC CHAPTER 53 COMPRESSED GASES



2018 IFC 5306.1, 5306.2: MEDICAL GAS STORAGE

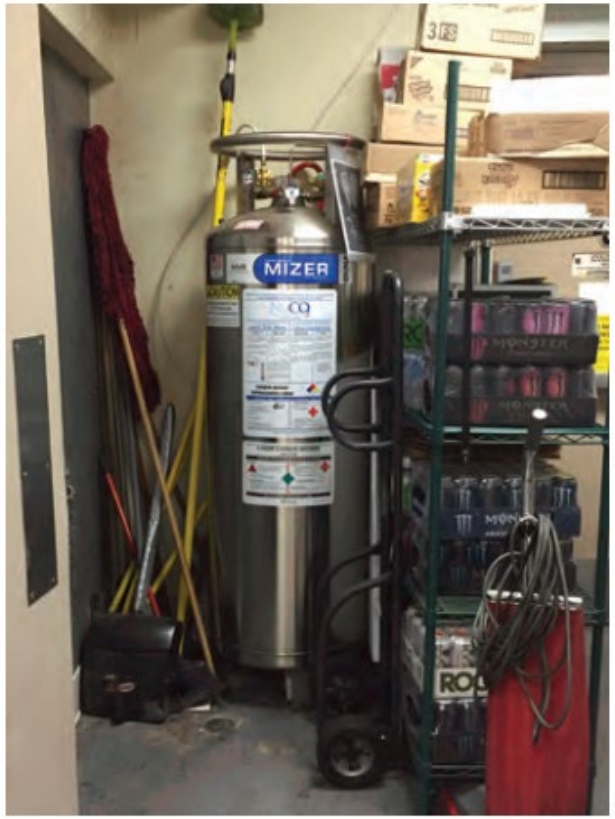
- Revises requirements for construction and ventilation of interior medical gas rooms
  - Now refers to Section 427 of the International Building Code
  - In 1-hour exterior rooms: requires vents with a minimum free opening area of 24 ➔ 36 inches squared
  - Clarifies phrasing and requirements for 1-hour interior room
  - Gas cabinets are required to be within a 1-hour rated enclosure if used as protection for medical gases



Medical gases can be stored in an exterior gas storage room.

2018 IFC 5307.1, 5307.3: LIQUID CARBON DIOXIDE SYSTEMS FOR BEVERAGE DISPENSING

- Removes permit requirements for liquid CO2 systems in beverage dispensing
  - Table 105.6.8 still requires permit when CO2 quantity above 100 pounds
- New gas detection system requirements
  - Alarm at CO2 concentrations of 5,000 and 30,000 ppm
  - Located within 12 inches of the floor where the gas is expected to accumulate or other approved locations



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Insulated liquid carbon dioxide systems exceeding 100 pounds must be provided with either mechanical ventilation or a gas detection system.

2018 IFC 5307.4: CARBON DIOXIDE ENRICHMENT SYSTEMS

- New Section 5307.4: Carbon dioxide enrichment systems
  - Applies to systems with 100+ pounds of carbon dioxide or when the refill connection is remote from the tanks or vessels
  - Requirements for documentation, equipment listing, and signage
  - Gas detection systems required to alarm at CO2 concentrations of 5,000 and 30,000 ppm

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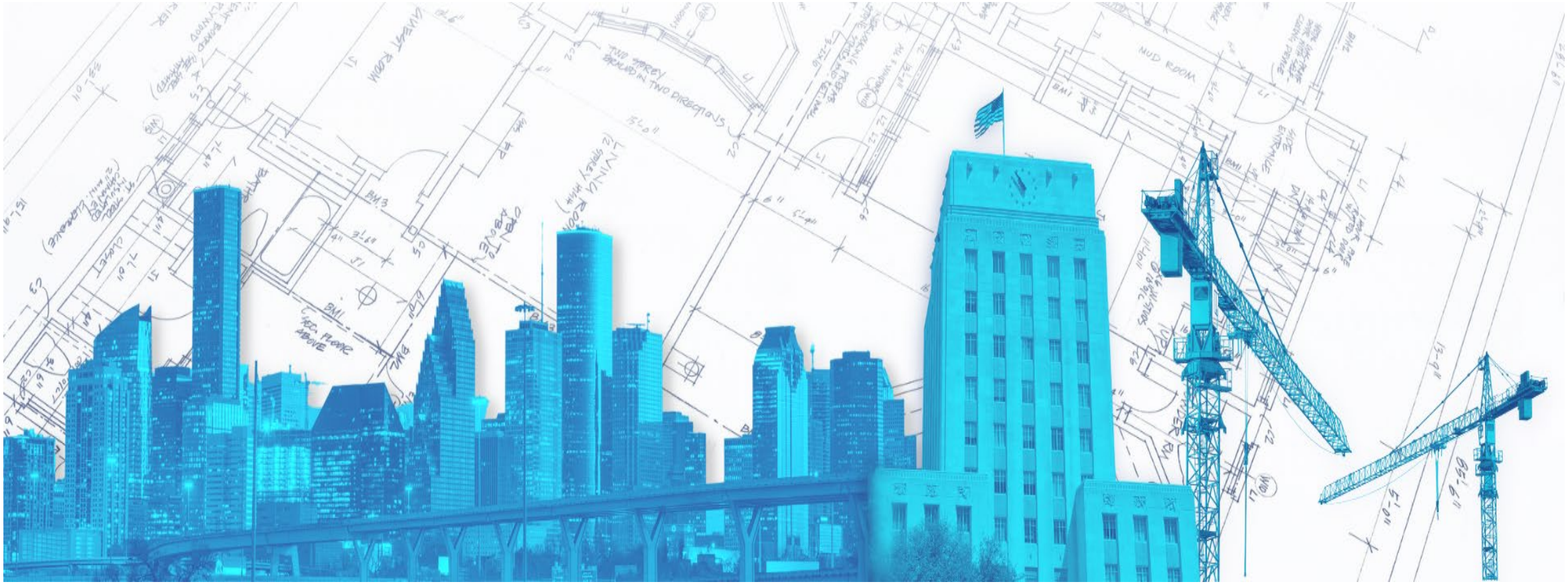
Carbon dioxide storage vessel used in a carbon dioxide enrichment system.

IFC CHAPTER 56 EXPLOSIVES AND FIREWORKS



2021 IFC 5601.1.3: RETAIL OF CONSUMER USE FIREWORKS

- Clarifies referenced NFPA standard for fireworks sale and storage
  - Storage and sale must comply with NFPA 1124 ➔ 2006 edition of NFPA 1124

Retail sales of fireworks must comply with the 2006 edition of NFPA 1124.

2021 IFC 5606.1, 5606.6: AMMUNITION RELOADING IN COMMERCIAL OPERATIONS

- New requirements for ammunition reloading in commercial applications
  - Addresses nearby equipment: electrical components, static electricity, and exhaust fans
  - Addresses safety: waste disposal, smokeless powder, and static/grounding equipment

Photo courtesy of Vanita Janthra/iStock / Getty Images Plus/ Getty Images

Safety precautions are necessary to conduct commercial ammunition reloading operations.

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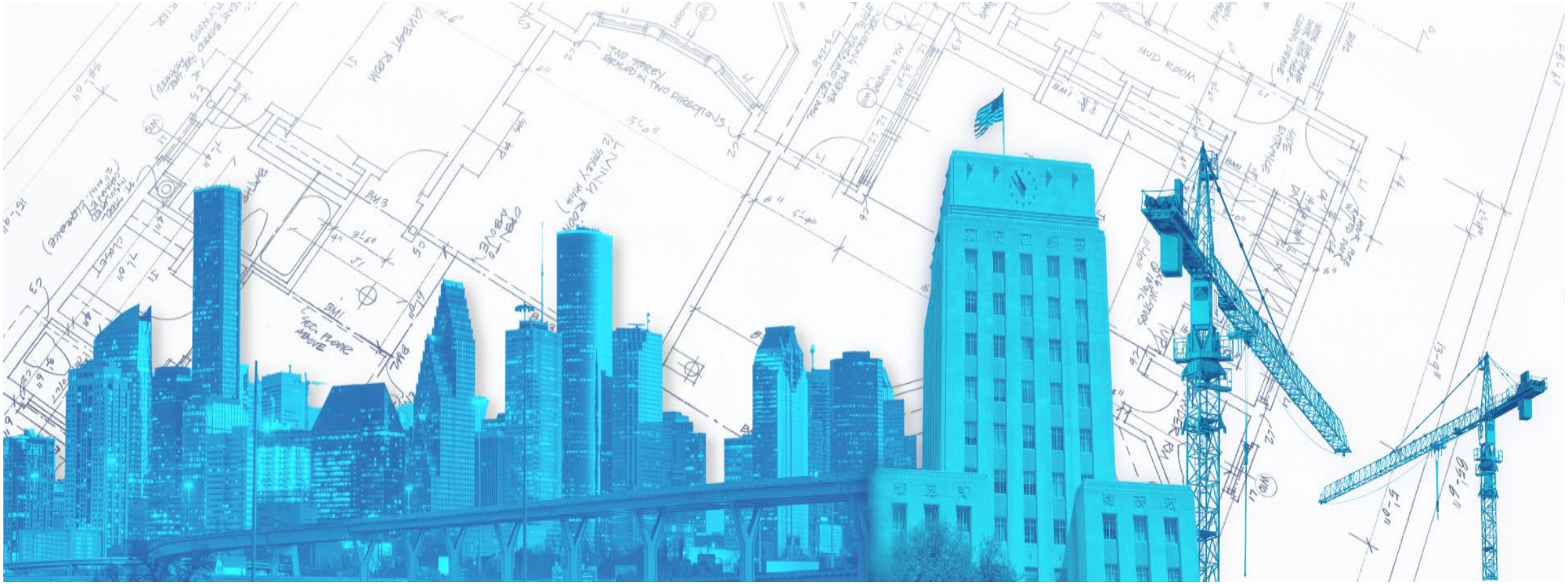
IFC CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS



2018 IFC 5707: MOBILE FUELING OPERATIONS

- New Section 5707: On-demand Mobile Fueling Operations
  - Requirements for approval, documentation, safety and emergency response plan, and site location.
  - Requirements for equipment operation and safety

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This mobile fueling operation is occurring in a parking lot at a business office.

2021 IFC 5707.1, 5707.2, 5707.2.1, 5707.2.2: ON-DEMAND MOBILE FUELING

- Allows fire code official to approve on-demand mobile fueling locations
- Mobile fueling vehicle classifications based on quantity of fuel carried
  - Cutoffs are 1,600 gallons, 800 gallor
- Mobile fueling vehicle requirements a
  - Chassis-mounted individual tanks ov
  - Securement of safety cans
  - Prohibited to fuel vehicle from tank n mobile fueling vehicle

Photo courtesy of Booster Fuels, Inc.

Tier 1 mobile fueling vehicle.

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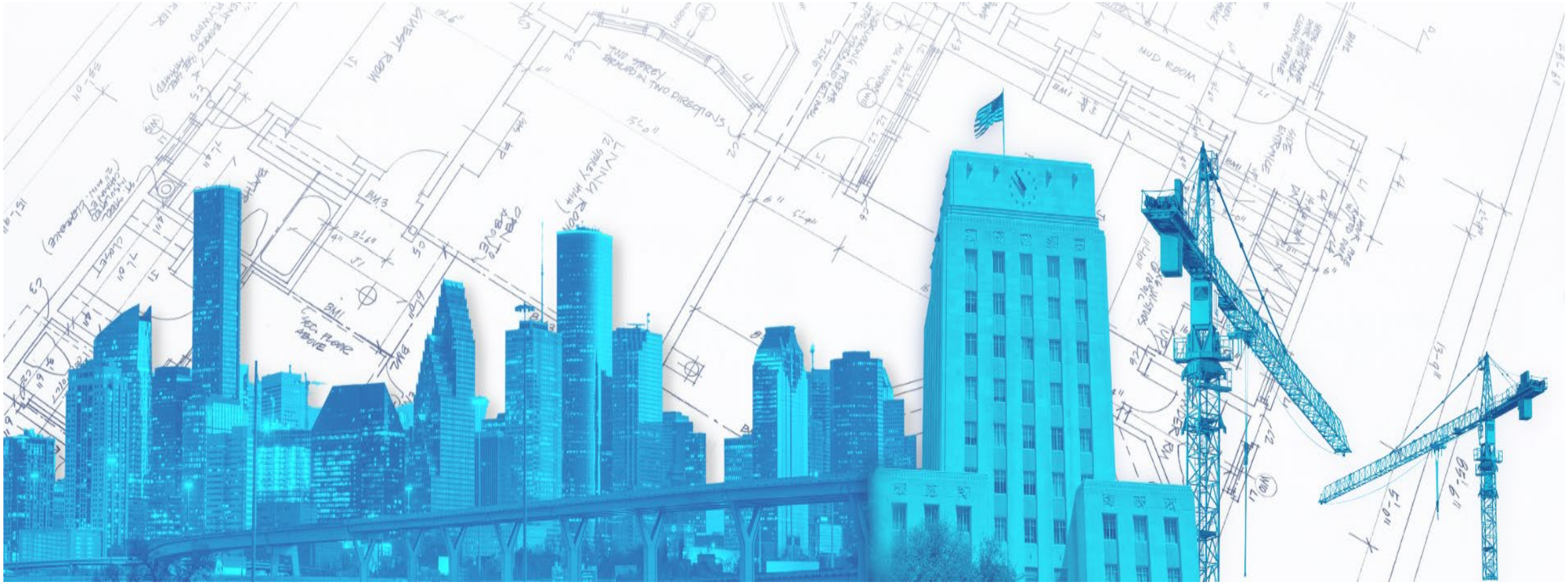
IFC CHAPTER 61 LIQUEFIED PETROLEUM GASES



2018 IFC TABLE 6104.3: LOCATION OF LP-GAS CONTAINERS

- New Footnote g: specifies separations between above-ground LP-gas containers and public ways
  - Above-ground LP-gas containers with water capacity under 2,000 gallons to be separated by a minimum 5 feet
  - Containers above 2,000 gallons to comply with Table 6104.3

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Separation between this LP-gas container and the public way is based on whether the container is greater than 2,000 gallon water capacity.

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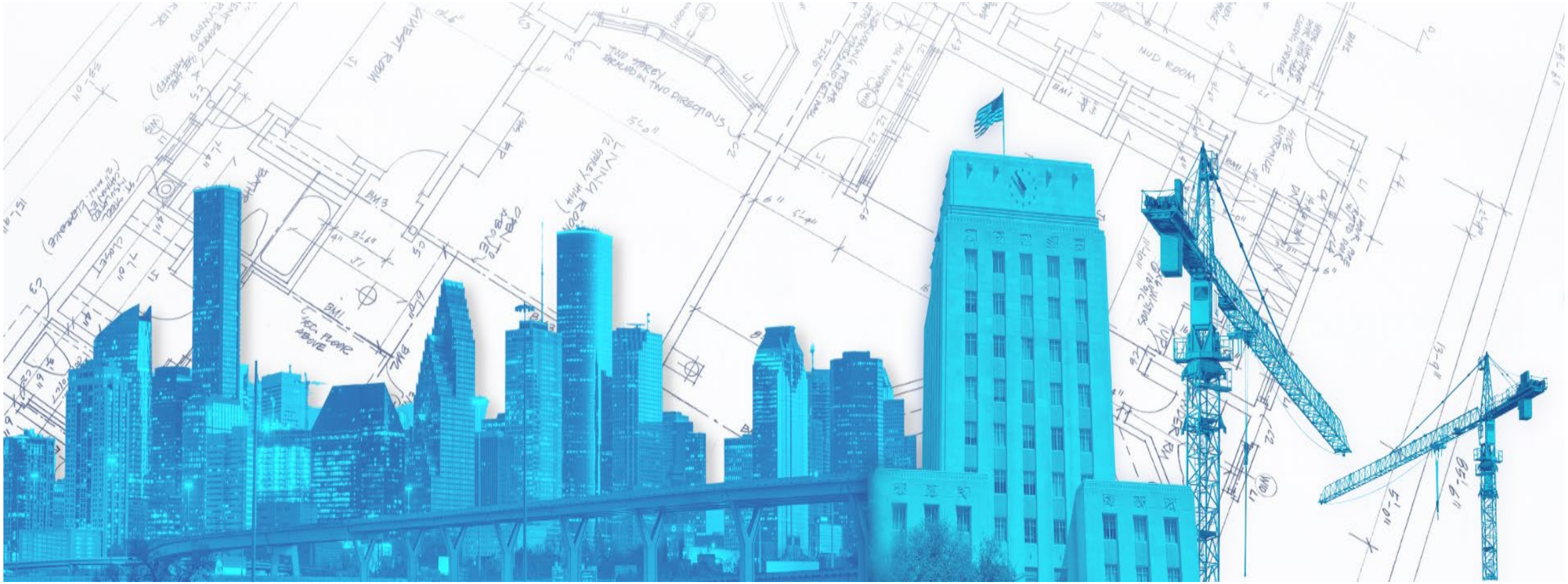
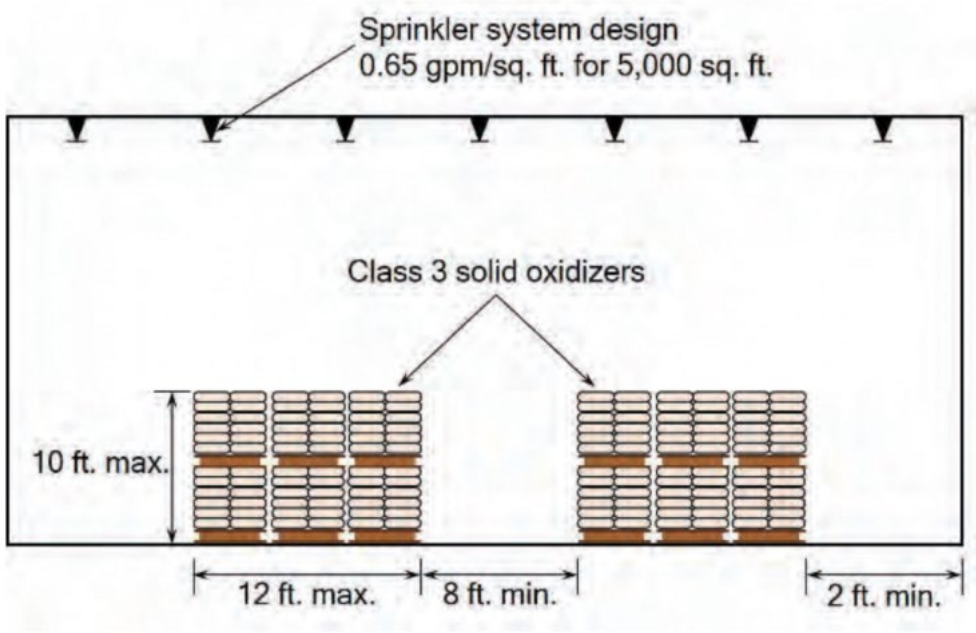
IFC CHAPTER 63 OXIDIZERS, OXIDIZING GASES AND OXIDIZING CRYOGENIC FLUIDS



2021 IFC 6303.1.4, TABLE 6303.1.4, TABLE 6304.1.5(1), TABLE 6304.1.5(2): STORAGE OF OXIDIZERS

- Correlates and revises requirements for oxidizer storage configurations
  - Reorganizes information in tables regarding storage of Class 2 and 3 oxidizer liquids and solids
  - Footnote added specifying maximum storage height for Class 2 and 3 oxidizers
  - Footnote added addressing control areas and MAQs for a building



Criteria is added for palletized storage of Class 3 oxidizers. Every portion of a pile must be within 8 feet of an aisle.

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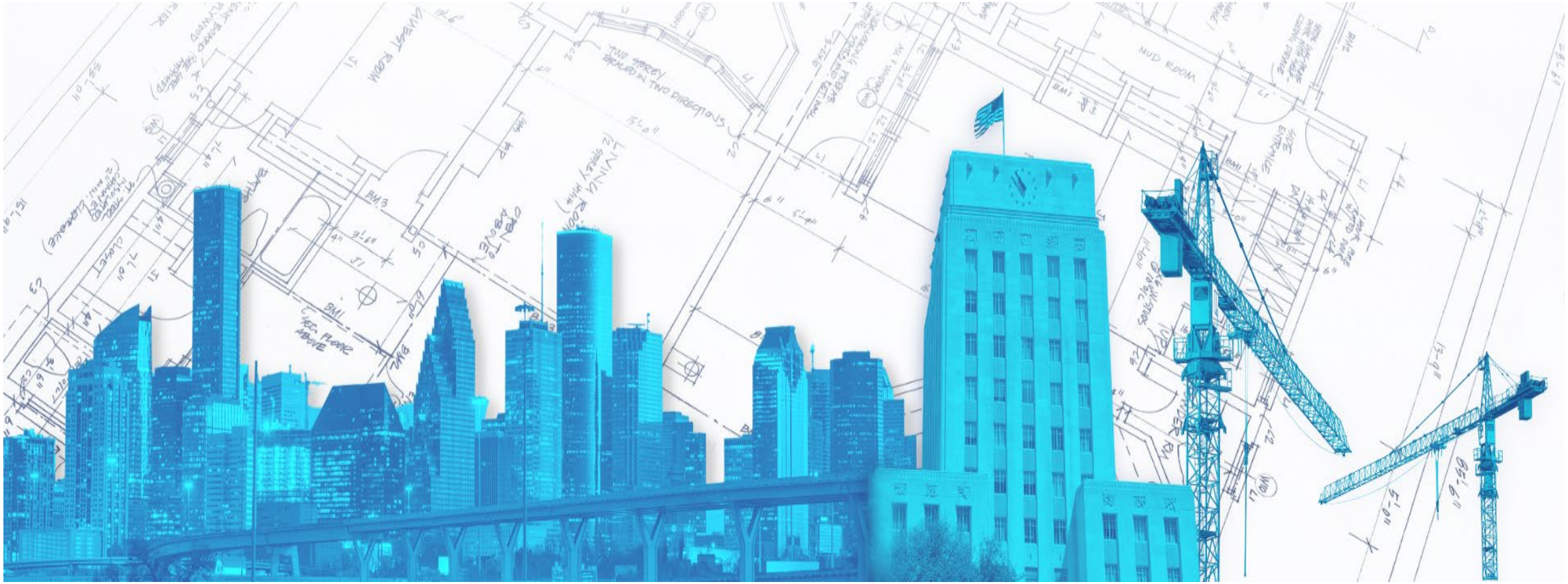
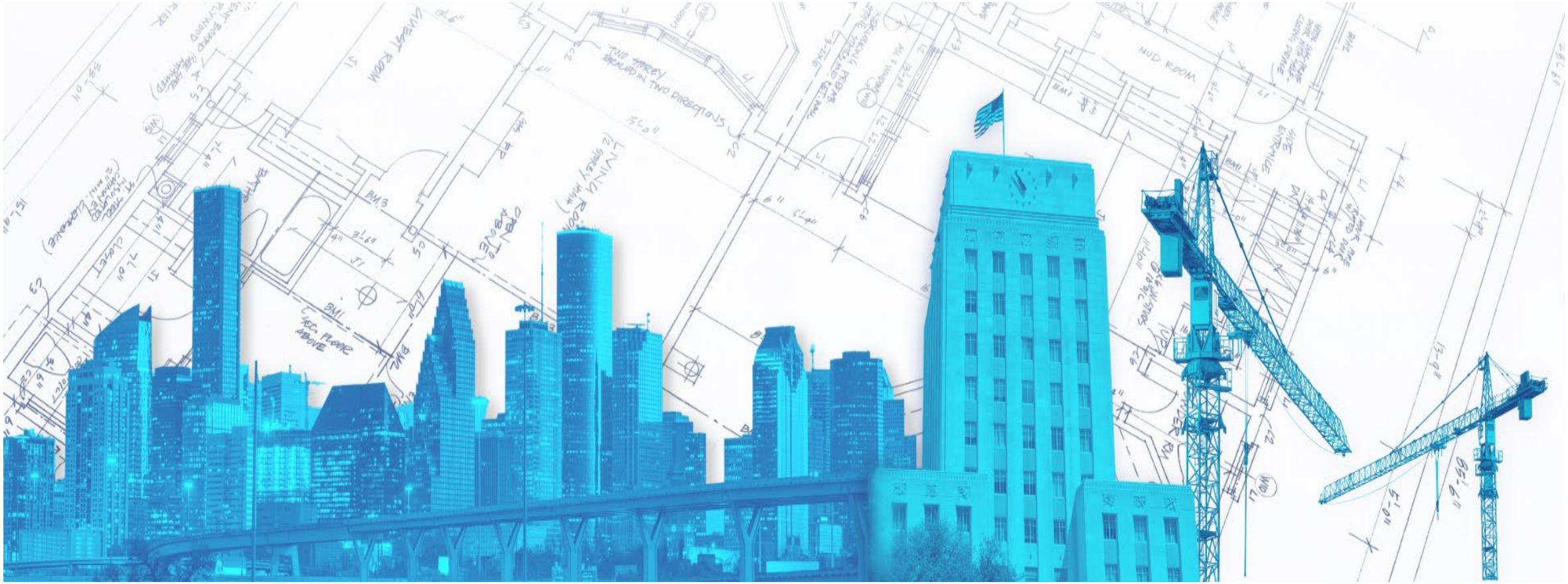
IFC APPENDIX D FIRE APPARATUS ACCESS ROADS



HOUSTON AMENDMENTS D105.1: AERIAL FIRE APPARATUS ACCESS ROADS

- Approved aerial fire apparatus access roads required where the vertical distance between grade plane and the highest roof surface exceeds 30 feet
  - Exception: Where approved, buildings of Type IA, Type IB or Type IIA construction with automatic sprinkler system and fire fighter access through an enclosed stairway
    - Stairway must have Class I standpipe from lowest level of fire department vehicle access to all roof surfaces
    - Does not apply to Group R and I occupancies

IFC APPENDIX E HAZARD CATEGORIES



2018 IFC E102.1.7.1: HAZARD CLASSIFICATION OF OXIDIZERS

- Revises oxidizer classification of sodium dichloro-s-triazinetrione anhydrous (sodium dichloroisocyanurate anhydrous)
  - Class 3 ➔ Class 2

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Many pool chemicals with the primary constituent of sodium dichloro-s-triazinetrione anhydrous are reclassified as Oxidizer Class 2.

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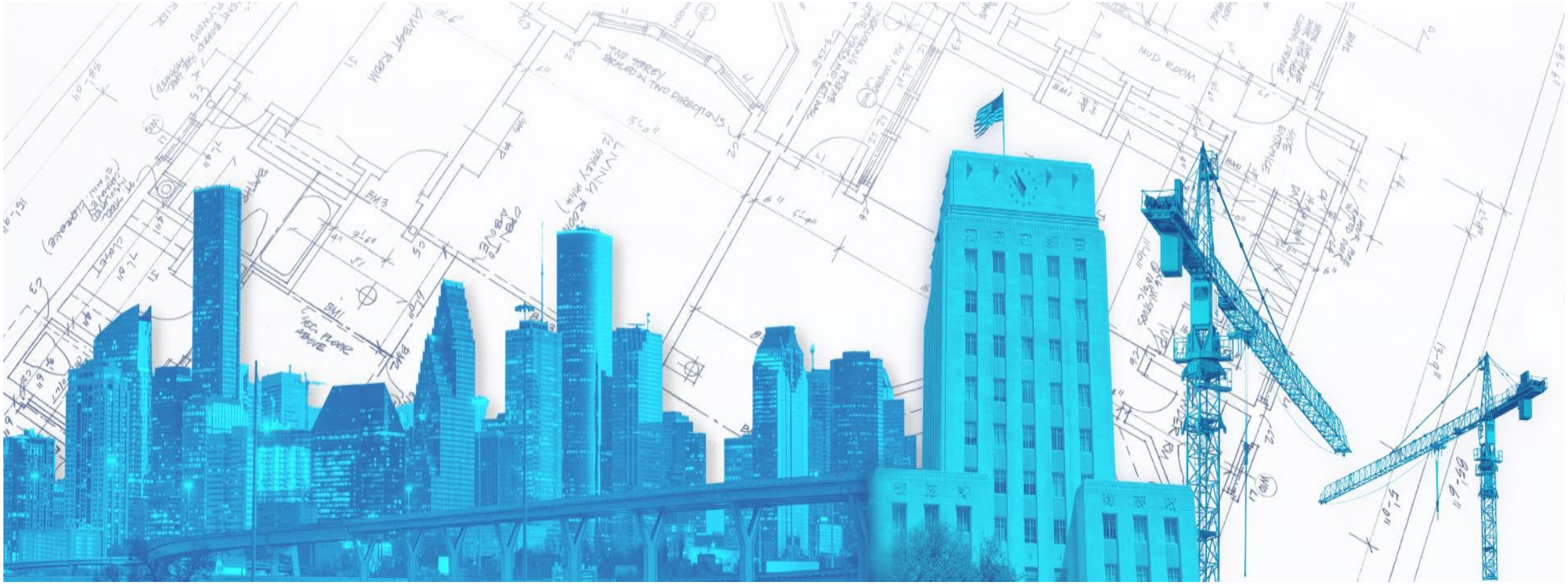
IFC APPENDIX H HAZARDOUS MATERIALS MANAGEMENT PLAN (HMMP) AND HAZARDOUS MATERIALS INVENTORY STATEMENTS (HMIS) INSTRUCTIONS



2021 IFC APPENDIX H, SECTION H104, H104.1, H104.2: CHEMICAL FACILITY ANTI-TERRORISM STANDARDS

- New section H104: Establishes requirements for chemical facilities deemed high-risk by the US Department of Homeland Security
  - Must develop security plans in accordance with the Chemical Facility Anti-Terrorism Standards (CFATS)

Evaluation by DHS under the CFATS is required in addition to security at this facility.

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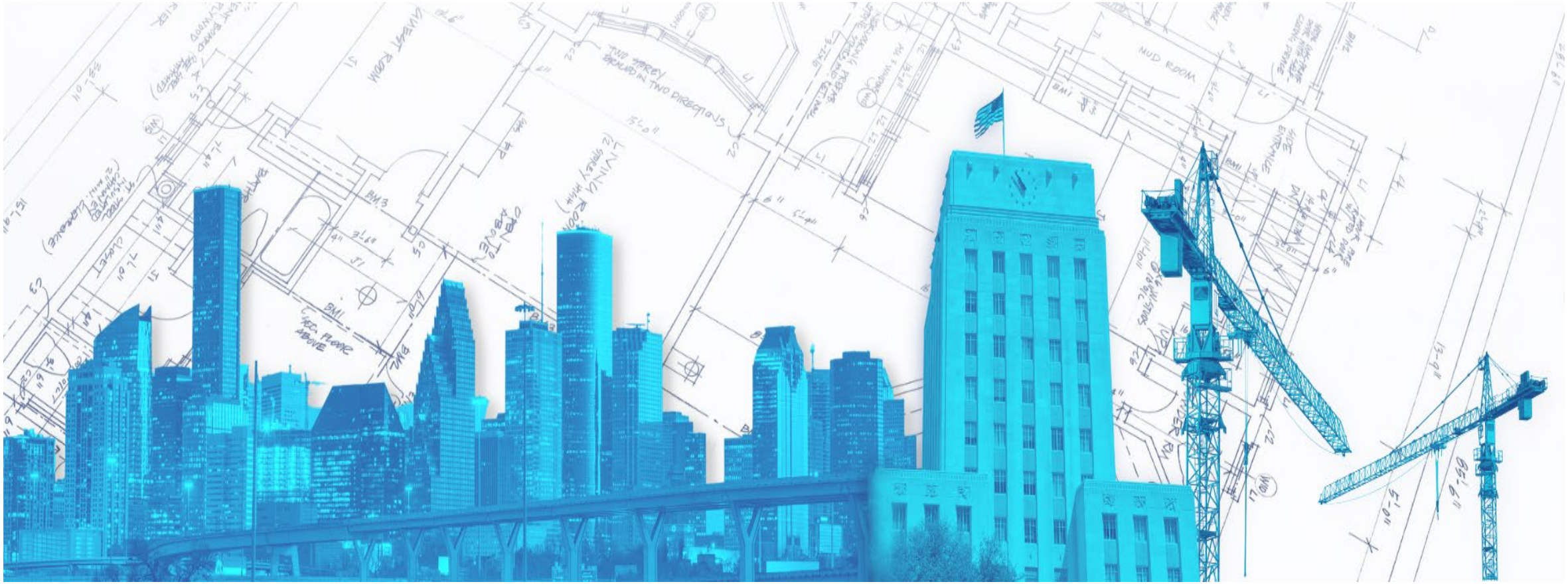
IFC APPENDIX N INDOOR TRADE SHOWS AND EXHIBITIONS



2018 IFC CHAPTER N: INDOOR TRADE SHOWS AND EXHIBITIONS

- New Appendix N: Indoor Trade Shows And Exhibitions
  - Specifies regulations for hazards associated with large trade shows and exhibitions
  - Does not apply to trade shows or exhibitions where the exhibit area is:
    - Less than 1,500 square feet in non-sprinklered building with at least 2 remote exits
    - Less than 4,500 square feet in sprinklered building with at least 2 remote exits

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Large trade shows and exhibits must comply with specific requirements in Appendix N, when the appendix is adopted.

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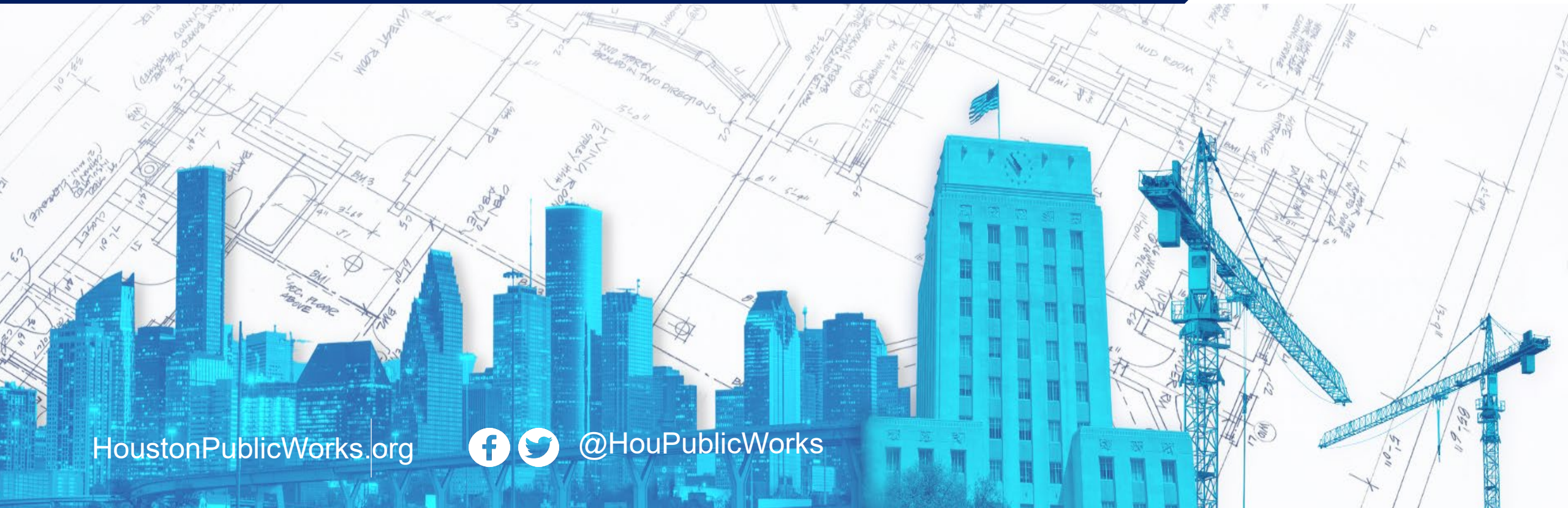
THANK YOU!



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