




Goal 

- Participants will be able to assign the appropriate occupancy classification(s) based on Chapter 3, use Table 601 to **help determine** type of construction classification, and gain an understanding of the varied provisions of Chapter 5 regarding allowable building heights and areas.

Objectives 

Upon completion, participants will be better able to:

- Identify and describe the 26 specific occupancy groups established in the 2018 IBC.
- Identify the characteristics of the nine types of construction set forth in the 2018 IBC.

Objectives 

Upon completion, participants will be better able to:


- Determine the allowable height and area of a building based upon its occupancy classification, type of construction and special features.
- Apply the special provisions applicable to mixed-occupancy and unlimited area buildings.



Occupancy Classification




Occupancy Classification-General Requirements (Section 302.1)



Types of Use	General Occupancy Group	Occupancy Sub-Groups
Assembly	Group A	A-1, A-2, A-3, A-4, A-5
Business	Group B	None
Educational	Group E	None
Factory and Industrial	Group F	F-1, F-2
High Hazard	Group H	H-1, H-2, H-3, H-4, H-5
Institutional	Group I	I-1, I-2, I-3, I-4
Mercantile	Group M	None
Residential	Group R	R-1, R-2, R-3, R-4
Storage	Group S	S-1, S-2
Utility	Group U	None

Occupancy Classification—Assembly




Group A (Section 303.1)

Assembly Group A occupancies include buildings or portions of buildings where persons (usually 50 or more) gather for:

- Civic, social or religious functions.
- Recreation.
- Food and/or drink consumption.
- Awaiting transportation.
- Similar activities.


**Occupancy Classification—
Assembly**



Group A-1 (Section 303.2)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ High occupant density ▪ Usually fixed seating ▪ Foyers/lobbies ▪ Stages, platforms or Projection screen ▪ Low-light conditions ▪ Sizable occupant loads 	<ul style="list-style-type: none"> ▪ Motion picture theaters ▪ Symphony/concert halls ▪ Television/radio studios ▪ Performance theaters


**Occupancy Classification—
Assembly**



Group A-2 (Section 303.3)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Consumption of food and/or drink (primary characteristic) ▪ Moderate occupant density ▪ Variable lighting levels ▪ Aisles not clearly defined ▪ Movable furnishings 	<ul style="list-style-type: none"> ▪ Banquet halls ▪ Night clubs ▪ Restaurants ▪ Taverns and bars ▪ Casino gaming areas


**Occupancy Classification—
Assembly**



Group A-3 (Section 303.4)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Moderate occupant density ▪ Adequate lighting levels ▪ Moderate fire loading 	<ul style="list-style-type: none"> ▪ Art galleries ▪ Exhibition halls ▪ Libraries ▪ Museums ▪ Places of religious worship


**Occupancy Classification—
Assembly**



Group A-4 (Sec. 303.5)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Lighting levels can fluctuate ▪ Some food or drink consumption ▪ Spectator seating typically fixed ▪ Medium to high density 	<ul style="list-style-type: none"> ▪ Arenas ▪ Skating rinks ▪ Gymnasiums


**Occupancy Classification—
Assembly**



Group A-5 (Sec. 303.6)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ No enclosure to contain smoke, although spectator might be protected from rain and sun ▪ Limited or no conditioned air ▪ Most seating is fixed 	<ul style="list-style-type: none"> ▪ Amusement park structures ▪ Bleachers and reviewing stands ▪ Grandstands ▪ Stadiums


**Occupancy Classification—
Business**



Group B (Section 304.1)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Many occupants are familiar with the premises ▪ Most occupants are adults capable of recognizing and effectively responding to "emergency situations" ▪ Moderate fire load 	<ul style="list-style-type: none"> ▪ Ambulatory care facilities ▪ Banks ▪ Barber/beauty shops ▪ Office areas ▪ Outpatient clinics ▪ Post offices ▪ Training and skill development


**Occupancy Classification—
Educational**



Group E (Sections 305.1, 305.2)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Six or more occupants at a time ▪ Students younger than college age ▪ 2½ years to the 12th grade is the general default age for this classification 	<ul style="list-style-type: none"> ▪ High schools (through 12th grade) ▪ Middle schools ▪ Elementary schools ▪ Preschools ▪ Day care facilities (more than 5 children, older than 2½ years)


**Occupancy Classification—
Factory/Industrial**



Group F occupancies (Sec. 306.1) are facilities where manufacturing operations and similar industrial activities occur, other than those classified as Group H. Operations may include assembling, fabricating, finishing, manufacturing, packaging, repair or processing work.

- F-1: where combustible materials are used in the operations.
- F-2: where all of the materials are noncombustible.

**Occupancy Classification—
High Hazard**



Group H occupancies (307.1):

- Involve the manufacturing, processing, generation or storage of materials that constitute a physical and/or health hazard.
- Quantities of such hazardous materials exceed those permitted within control areas as regulated by Section 414.2, based on Tables 307.1(1) and/or 307.1(2).

Occupancy Classification— High Hazard

Conditions not considered as Group H: There are 17 conditions (Section 307.1.1) where a classification of Group H is not to be assigned.

Even if the structure meets one of these conditions, the provisions of Section 414 and the *International Fire Code®* (IFC®) for such materials are still applicable.


Maximum Allowable Quantities- Physical hazards

MATERIAL	CLASS	CLASSIFICATION	GASES		LIQUIDS		SOLIDS		TOXIC OR COMBUSTIBLE	
			Permissible quantity (pallets)	Permissible quantity (pallets)	Permissible quantity (pallets)	Permissible quantity (pallets)	Permissible quantity (pallets)	Permissible quantity (pallets)		
Compressible dust	NA	H-2	See Note 9	NA	NA	See Note 9	NA	See Note 9	NA	NA
Compressible dust ^a	None	H-3	1000 (1,000)	NA	NA	1000 (1,000)	NA	NA	120 (120)	NA
Compressible liquid ^b	None	H-2 or H-3	120 ^c	NA	NA	120 ^c	NA	NA	30 ^d	30 ^d
	HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ	H-2 or H-3	NA	130 ^e	NA	NA	130 ^e	NA	NA	30 ^d
Cryogenic flammable	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
Cryogenic inert	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
Cryogenic oxidizing	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
	None	H-2	NA	40 ^f	NA	NA	40 ^f	NA	NA	10 ^f
Explosives	None	H-1	1 ^g	1 ^g	NA	1 ^g	1 ^g	NA	1 ^g	1 ^g
	None	H-1	1 ^g	1 ^g	NA	1 ^g	1 ^g	NA	1 ^g	1 ^g
Flammable gas	None	H-2	NA	1,000 ^h	NA	NA	1,000 ^h	NA	NA	NA
	None	H-2	NA	1,000 ^h	NA	NA	1,000 ^h	NA	NA	NA
Flammable liquid ⁱ	None	H-2	NA	30 ^j	NA	NA	30 ^j	NA	NA	10 ^j
	None	H-2	NA	30 ^j	NA	NA	30 ^j	NA	NA	10 ^j
Flammable liquid, combination (HA, HB, HC)	None	H-2	NA	120 ^k	NA	NA	120 ^k	NA	NA	30 ^l
	None	H-2	NA	120 ^k	NA	NA	120 ^k	NA	NA	30 ^l

Maximum Allowable Quantities- Physical hazards

- 1. Not Licensed, NA = Not Applicable, U/D = Unclassified/Domestic.
- 2. For use of control area, see Section 414.2.
- 3. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- 4. The quantity of alcoholic beverages in retail and wholesale sales occupancies shall not be limited provided the liquids are packaged in individual containers not exceeding 1.5 gallons. In retail and wholesale sales occupancies, the quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 20 percent by volume of water miscible liquids with the remainder of the solution not being flammable, shall not be limited provided that such materials are packaged in individual containers not exceeding 1.5 gallons.
- 5. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 503.3.1.1. Where Note 6 also applies, the increase for both notes shall be applied cumulatively.
- 6. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, dry boxes, gas cabinets, gas rooms or exhausted enclosures or in limited safety cans in accordance with Section 5003.10 of the International Fire Code. Where Note 6 also applies, the increase for both notes shall be applied cumulatively.
- 7. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 503.3.1.1.
- 8. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 503.3.1.1.
- 9. Containing not more than the maximum allowable quantity per control area of Class I, II or III flammable liquids.
- 10. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 603.3.2 of the International Fire Code.
- 11. Quantities in parentheses indicate quantity stored in cylinders at the head of each column.
- 12. A maximum quantity of 230 pounds of solid or 22 gallons of liquid Class I oxidizers is allowed when such materials are necessary for maintenance purposes, operation or maintenance of apparatus when the storage containers and the amount of storage are approved.
- 13. Not weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.
- 14. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.
- 15. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Table 414.2.5(1) and 414.2.5(2).
- 16. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 503.3.1.1.
- 17. The following shall not be included in determining the maximum allowable quantities:
 - 1. Liquid or gaseous fuel in fuel tanks on vehicles.
 - 2. Liquid or gaseous fuel in fuel tanks on mechanical equipment operated in accordance with the International Fire Code.
 - 3. Gases in piping systems and fixed appliances regulated by the International Fuel Gas Code.
 - 4. Liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code.
 - 5. Alcohol-based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with Sections 3705.5 and 3705.5.1 of the International Fire Code. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents.
- 18. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.5.

Maximum Allowable Quantities— Health hazards




MATERIAL	STORAGE ^g			USE-CLOSED SYSTEM ^h		USE-OPEN SYSTEM ⁱ	
	Solid ^k pounds ^h	Liquid gallons ^h (pounds) ^h	Gas cubic feet at NTP ^h (pounds) ^h	Solid ^k pounds ^h	Liquid gallons ^h (pounds) ^h	Solid ^k pounds ^h	Liquid gallons ^h (pounds) ^h
Corrosives	5,000	500	Gas cubic feet at NTP Liquefied (150)	5,000	500	Gas cubic feet at NTP Liquefied (150)	1,000 (100)
Highly Toxic	10	(10)	Gas cubic feet at NTP Liquefied (14F)	10	(10)	Gas cubic feet at NTP Liquefied (14F)	3 (3)
Toxic	500	(500)	Gas cubic feet at NTP Liquefied (150F)	500	(500)	Gas cubic feet at NTP Liquefied (150F)	125 (125)

For SI: 1 cubic foot = 0.028 m³; 1 pound = 0.454 kg; 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.
b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
c. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.2 gallons.
d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.3. Where Note e also applies, the increase for both areas shall be applied accumulatively.
e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, gas cabinets or enhanced enclosures as specified in the International Fire Code. Where Note d also applies, the increase for both areas shall be applied accumulatively.
f. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.3, see Tables 414.2.5(1) and 414.2.5(2).
g. Allowed only when stored in approved enhanced gas cabinets or enhanced enclosures as specified in the International Fire Code.
h. Quantities in parentheses indicate quantity limits in parentheses at the head of each column.
i. For gallons of liquid, divide the amount in pounds by 10 in accordance with Section 3003.1.2 of the International Fire Code.
j. For gallons of liquid, divide the amount in pounds by 10 in accordance with Section 3003.1.2 of the International Fire Code.
k. For gallons of liquid, divide the amount in pounds by 10 in accordance with Section 3003.1.2 of the International Fire Code.


Occupancy Classification— High Hazard



STORY	Higher than 9 7-9 6 5 4 3 2 1	PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA ^a	NUMBER OF CONTROL AREAS PER STORY	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOUR ^b
	Higher than 9	5	1	2
	7-9	5	2	2
	6	12.5	2	2
	5	12.5	2	2
	4	12.5	2	2
	3	50	2	1
	2	75	2	1
	1	100	4	1
	Below grade: 1 2 Lower than 2	75 50 Not Allowed	3 2 Not Allowed	1 1 Not Allowed


a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the notes to these tables.
b. Separation shall include fire barriers and horizontal assemblies as necessary to provide separation from other portions of the building.

Occupancy Classification—High Hazard (Higher Educ. Labs)




FLOOR LEVEL	21+ 16-20 11-15 7-10 4-6 3 1-2 1 2 Lower than 2	PERCENTAGE OF THE MAXIMUM ALLOWABLE QUANTITY PER LAB SUITE ^a	NUMBER OF LAB SUITES PER FLOOR	FIRE-RESISTANCE RATING FOR FIRE BARRIERS IN HOUR ^b
	21+	Not allowed	Not Permitted	Not Permitted
	16-20	25	1	2"
	11-15	50	1	2"
	7-10	50	2	2"
	4-6	75	4	1
	3	100	4	1
	1-2	100	6	1
	1	75	4	1
	2	50	2	1
	Lower than 2	Not Allowed	Not Allowed	Not Allowed

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 307.1(1) and 307.1(2), with all increases allowed in the footnotes to these tables.
b. Fire barriers shall include walls, floors and ceilings necessary to provide separation from other portions of the building.
c. Vertical fire barriers separating laboratory suites from other spaces on the same floor shall be permitted to be 1-hour fire-resistance rated.

Occupancy Classification—High Hazard 


Types of Materials by Group
Group H-1 (Section 307.3)

- Explosives
- Detonable pyrophoric materials
- Organic peroxides, unclassified detonable
- Oxidizers, Class 4
- Unstable (reactive) materials, Class 3 detonable and Class 4

Occupancy Classification—High Hazard 

Types of Materials by Group
Group H-2 (Section 307.4)


- Combustible dust
- Flammable and combustible liquids (Class I, II and IIIA) in open systems
- Cryogenic fluids, flammable
- Organic peroxides, Class I
- Flammable gases
- Oxidizers, Class 3, in open systems
- Pyrophoric materials, nondetonable
- Unstable (reactive) materials, Class 3, nondetonable
- Water-reactive materials, Class 3

Occupancy Classification—High Hazard 

Types of Materials by Group
Group H-3 (Section 307.5)

- Combustible fibers
- Flammable and combustible liquids (Class I, II and IIIA) in closed systems
- Flammable solids
- Organic peroxides, Classes II and III
- Oxidizers, Class 2
- Oxidizers, Class 3, in closed systems
- Oxidizing gases
- Unstable (reactive) materials, Class 2
- Water-reactive materials, Class 2
- Cryogenic fluids, oxidizing
- Consumer fireworks, 1.4G (Class C, Common)


**Occupancy Classification—
High Hazard**



Types of Materials by Group

<p>Group H-4 (Section 307.6)</p> <ul style="list-style-type: none"> ▪ Corrosives ▪ Toxic materials ▪ Highly toxic materials 	<p>Group H-5 (Section 307.7)</p> <ul style="list-style-type: none"> ▪ Semiconductor fabrication facilities and comparable research and development areas
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**Occupancy Classification—
Institutional**



Group I-1 (Section 308.2)

<p>Characteristics</p> <ul style="list-style-type: none"> ▪ More than 16 occupants (not including staff). ▪ Residents—require assistance with day-to-day living tasks. ▪ Housed on a 24-hour basis. ▪ Custodial care includes persons who evacuate at a slower rate. ▪ Residents may have mental and psychiatric complications. 	<p>Examples</p> <ul style="list-style-type: none"> ▪ Group homes ▪ Rehabilitation facilities ▪ Halfway houses ▪ Assisted living facilities <p>Cond. 1- Capable of Self Preservation</p> <p>Cond. 2- Ltd. Verbal/ Physical Asst.</p>
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**Occupancy Classification—
Institutional**



Group I-2 (Section 308.3)

<p>Characteristics</p> <ul style="list-style-type: none"> ▪ Used for medical care activities for six or more persons. ▪ Receive 24-hour care. ▪ May be semi-aware or semi-ambulatory, but not capable of self-preservation. 	<p>Examples</p> <ul style="list-style-type: none"> ▪ Hospitals ▪ Detoxification facilities ▪ Nursing homes ▪ 24-hour infant/toddler care facilities (foster care facilities) <p>Cond. 1- Nursing home- No emergency care.</p> <p>Cond. 2- Hospital- Emergency care.</p>
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**Occupancy Classification—
Institutional**



Group I-3 (Section 308.4)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ More than 5 occupants (not including staff). ▪ Supervised. ▪ Physically restricted from evacuating the building. ▪ Further classified into 5 occupancy conditions based on capability of free movement within facility. 	<ul style="list-style-type: none"> ▪ Detention centers ▪ Jails ▪ Prerelease centers ▪ Prisons


**Occupancy Classification—
Institutional**



Group I-4 (Section 308.5)


Characteristics	Examples
<ul style="list-style-type: none"> ▪ More than 5 occupants. ▪ Any age. ▪ Receive custodial care for less than 24 hours a day. ▪ Occupants incapable of self preservation. 	<ul style="list-style-type: none"> ▪ Adult care facilities ▪ Child care facilities

**Occupancy Classification—
Mercantile**




Group M (Section 309.1)

Characteristics	Examples
<ul style="list-style-type: none"> ▪ Display, sell and stock merchandise. ▪ If merchandise is hazardous, see Table 414.2.5(1) for quantity limits. 	<ul style="list-style-type: none"> ▪ Retail stores ▪ Motor fuel-dispensing facilities

**Occupancy Classification—
Residential** 


- Residential occupancies fall into two categories:
 - Transient (Group R-1)
 - Nontransient (Group R-2)
 - Transient/Nontransient (Groups R-3 and R-4)

Transient—Occupancy of a dwelling unit or sleeping unit for not more than 30 days.

**Occupancy Classification—
Residential** 


Group R-4 (Section 310.5)

Characteristics	Examples
<ul style="list-style-type: none"> Care facilities having more than 5 but not more than 16 occupants, excluding staff. 	<ul style="list-style-type: none"> Residential care facilities Assisted living facilities
	<p>Cond. 1- Capable of Self Preservation</p> <p>Cond. 2- Ltd. Verbal/ Physical Asst.</p>

**Occupancy Classification—
Storage** 

- Group S classifications are similar to those in the Group F categories.
- Those storage occupancies classified as Group S-1 typically contain some degree of combustible materials.
- No storage of combustible materials is anticipated in Group S-2 occupancies.

**Occupancy Classification—
Utility and Miscellaneous**



Group U (Section 312.1)


Characteristics	Examples
<ul style="list-style-type: none"> ▪ No public occupancy ▪ Limited or no occupant load ▪ Limited floor area ▪ Little fire hazard 	<ul style="list-style-type: none"> ▪ Agricultural buildings ▪ Barns ▪ Carports ▪ Tanks and towers ▪ Livestock shelters ▪ Private garages ▪ Stables



Incidental Uses

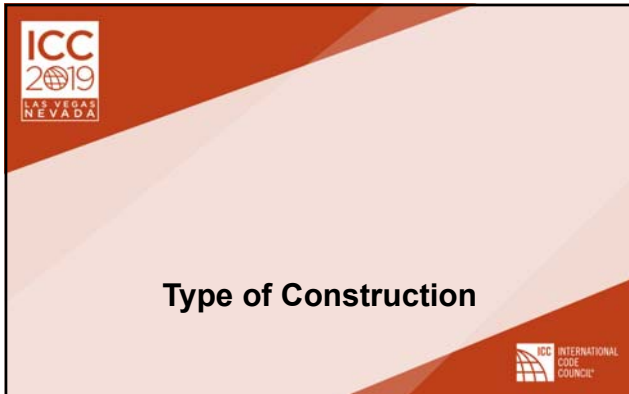


Incidental Uses- 509



ROOM OR AREA	SEPARATION AND/OR PROTECTION
Flammable rooms where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 17 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery rooms	1 hour or provide automatic sprinkler system
Refrigerant rooms	1 hour or Group R, F, M, S and U occupancies; 2 hours in Group A, E, I and H occupancies
Hydrogen fuel gas rooms, not classified as Group H	2 hours and provide automatic sprinkler system
Refrigerant rooms	2 hours or 1 hour and provide automatic sprinkler system
Plant shops, not classified as Group H, located in occupancies other than Group H	1 hour or provide automatic sprinkler system
In Group H occupancies, laboratories and treatment shops, not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
In ambulatory care facilities, laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-1 cells and Group I-2 patient rooms equipped with gullied surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 500 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Stationary storage battery systems having an energy capacity greater than the threshold quantity specified in Table 1306.2.1 of the International Fire Code	1 hour in Group R, F, M, S and U occupancies; 2 hours in Group A, E, I and H occupancies
Electrical installations and transformers	See Sections 131.26 through 131.3.4 and Sections 430.1 through 430.48 of NFPA 70 for protection and separation requirements.

For H, 1 square foot = 0.0929 m²; 1 pound per square inch (psi) = 6.89476 kPa; 1 British thermal unit (Btu) per hour = 0.293071 watts.
1 horsepower = 746 watts; 1 gallon = 3.78541 L; 1 cubic foot = 0.0283168 m³.



Type of Construction— General Provisions (Section 602)

Type of Construction		Materials of Construction
I	IA	Exterior and interior walls, floors, roof and structural elements to be of noncombustible materials.
	IB	
II	IIA	Exterior walls to be of noncombustible materials.
	IIB	
III	IIIA IIIB	Interior elements permitted to be of combustible materials.
IV	HT	Combustible materials permitted throughout.
V	VA	
	VB	

NOTE: The classification of the building for construction type is based on the elements of the building itself and not on what minimum type of construction is permitted because of its height and area.

Type of Construction—Table 601

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV		TYPE V	
	A	B	A	B	A	B	HT	A	B	
Primary structural frame ^a (see Section 202)	3 ^b	2 ^b	1 ^c	0	1 ^c	0	HT	1 ^d	0	
Roofing walls										
Exterior ^e	3	2	1	0	2	2	2	1	0	
Interior	3 ^f	2 ^f	1	0	1	0	HT	1	0	
Nonbearing walls and partitions	See Table 602									
Exterior										
Nonbearing walls and partitions										
Interior ^g	0	0	0	0	0	0	See Section 2106.11.2	0	0	
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0	
Roof construction and associated secondary members (see Section 202)	1 1/2 ^h	1 ^h	1 ^h	0 ⁱ	1 ^h	0	HT	1 ^h	0	

Footnote: 1 foot = 304.8 mm.
 a. Roof supports. Fire-resistance ratings of primary structural frames and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
 b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and diaphragms where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant treated wood members shall be allowed to be used for such unprotected members.
 c. In all occupancies, heavy timber complying with Section 2104.11 shall be allowed where a 3-hour or less fire-resistance rating is required.
 d. Not less than the fire-resistance rating required by other sections of this code.
 e. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
 f. Not less than the fire-resistance rating as referenced in Section 704.10.
 g. Not less than the fire-resistance rating as referenced in Section 704.10.
 h. Not less than the fire-resistance rating as referenced in Section 704.10.
 i. Not less than the fire-resistance rating as referenced in Section 704.10.

Type of Construction—Structural Frame Elements (Section 202)

The diagram illustrates structural frame elements with labels for 'Composite Steel Deck', 'No (no gravity load support)', and 'Yes'. It shows a cross-section of a building frame with various connections and supports.

Structural Frame Elements


Location of Lot — Table 602

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H ^c	OCCUPANCY GROUP F-1, M, S-1 ^d	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2, U ^e
X < 5 ^f	All	3	2	1
5 ≤ X < 10	IA	3	2	1
	Others	2	1	1
10 ≤ X < 30	IA, IB	2	1	1 ^g
	IB, VB	1	0	0
	Others	1	1	1 ^g
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.
 a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
 b. See Section 706.1.1 for party walls.
 c. Open parking garages complying with Section 409 shall not be required to have a fire-resistance rating.
 d. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
 e. For special requirements for Group H occupancies, see Section 413A.
 f. For special requirements for Group S aircraft hangars, see Section 412.3.1.
 g. Where Table 705.8 permits embedding exterior walls with unobstructed areas of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
 h. For a building containing only a Group U occupancy private garage or carport, the exterior wall shall not be required to have a fire-resistance rating when the fire separation distance is 5 feet (1524 mm) or greater.
 i. For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating when the fire separation distance is 5 feet (1524 mm) or greater.

Allowable Building Height and Area


Allowable Height in Feet Above Grade Plane (Table 504.3)



Occupancy Classification	See Footnotes	Type of Construction									
		Type I		Type II		Type III		Type IV	Type V		
		A	B	A	B	A	B	HT	A	B	
A,B,E,F,M,S,U	NS ^a	UL	160	65	55	65	55	65	50	40	
	S	UL	180	85	75	85	75	85	70	60	
H-1, H-2, H-3, H-5	NS ^{a,d}	UL	160	65	55	65	55	65	50	40	
	S	UL	160	65	55	65	55	65	50	40	

Note: UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1
 (Only a portion of Table 504.3 is shown above.)


Allowable Height in Stories Above Grade Plane (Table 504.4)



Occupancy Classification	See Foot-Notes	Type of Construction									
		Type I		Type II		Type III		Type IV	Type V		
		A	B	A	B	A	B	HT	A	B	
A-1	NS	UL	5	3	2	3	2	3	2	1	
	S	UL	6	4	3	4	3	4	3	2	
A-2	NS	UL	11	3	2	3	2	3	2	1	
	S	UL	12	4	3	4	3	4	3	2	
A-3	NS	UL	11	3	2	3	2	3	2	1	
	S	UL	12	4	3	4	3	4	3	2	

Note: UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1
 (Only a portion of Table 504.4 is shown above.)

Allowable Area Factor in Square Feet (Table 506.2)



Occupancy Classification	See Footnotes	Type of Construction									
		Type I		Type II		Type III		Type IV	Type V		
		A	B	A	B	A	B	HT	A	B	
A-1	NS	UL	UL	15,500	4,500	14,000	8,500	15,000	11,500	5,500	
	S1	UL	UL	62,000	34,000	56,000	34,000	60,000	46,000	22,000	
	SM	UL	UL	46,500	25,500	42,000	25,500	45,000	34,500	16,500	
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	15,000	11,500	6,000	
	S1	UL	UL	62,000	38,000	56,000	38,000	60,000	46,000	24,000	
	SM	UL	UL	46,500	28,500	42,000	28,500	45,000	34,500	18,000	
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	15,000	11,500	6,000	
	S1	UL	UL	62,000	38,000	56,000	38,000	60,000	46,000	24,000	
	SM	UL	UL	46,500	28,500	42,000	28,500	45,000	34,500	18,000	

**Buildings on the Same Lot
(Section 503.1.2)**

Assumed Imaginary Line Between Two Buildings on the Same Lot

Page 44

**Buildings on the Same Lot
(Section 503.1.2)**

Two Buildings on the Same Lot Regulated as a Single Building

**Occupied Roofs
(Section 503.1.4)**

Example:
If building of Type VA construction,
Group B: 4 stories max, (S)
Group A-3: 3 stories max, (S)

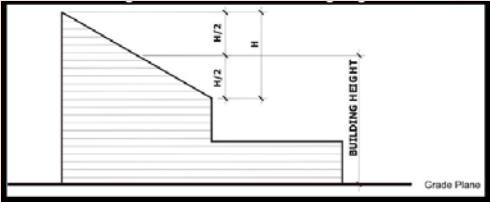
Except for complying penthouses, enclosures of occupied roof areas limited to 48 inches above roof surface

Notification appliances shall be provided per Section 907.5 **A-3** on roof

B
B
B
B

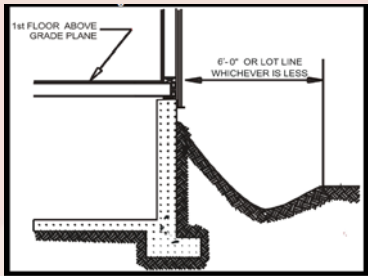
Sprinkler system required throughout per Section 903.3.1.1

**Allowable Height and Area—
Building Height (Section 502.1)**



Determination of Building Height

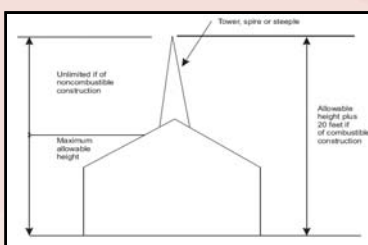
**Allowable Height and Area—
Grade Plane (Section 502.1)**



1st FLOOR ABOVE GRADE PLANE

6'-0" OR LOT LINE WHICHEVER IS LESS

**Allowable Height —
Roof Structures (Section 504.3)**



Tower, spire or steeple

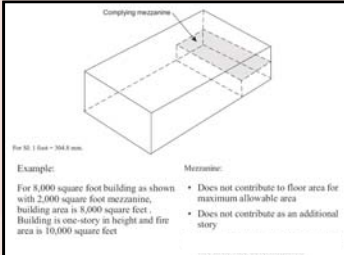
Unlimited if of noncombustible construction

Maximum allowable height

Allowable height plus 20 feet if of combustible construction

Height Limits of Roof Structures

Mezzanines (Section 505)



For 10-foot or less mezzanine.

Example:
For 8,000 square foot building as shown with 2,000 square foot mezzanine, building area is 8,000 square feet. Building is one-story in height and fire area is 10,000 square feet.

Mezzanine:

- Does not contribute to floor area for maximum allowable area
- Does not contribute as an additional story

Mezzanine Limitations

Frontage Increase (Section 506.3.3)

- Formula to calculate the frontage increase (I_f) for allowable area purposes:

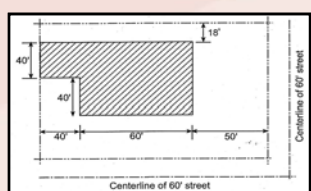
$$I_f = [F/P - 0.25] W/30$$

I_f = Area factor increase due to frontage
 F = Building perimeter that fronts on a public way or open space having 20 feet open minimum distance
 P = Perimeter of entire building
 W = Width of public way or open space per Section 506.3.2

The value of W must be a minimum of 20 feet. Where W exceeds 30 feet, a value of 30 feet is to be used. (Section 506.3.2)

Frontage Increase Example

- **Given:** Yards as shown, and two 60-foot streets.
- **Determine:** Percentage of frontage increase for allowable area.



Frontage Increase Example

Solution:

$$I_f = \left[\frac{F}{P} - 0.25 \right] \frac{W}{30}$$

$F = 220$ feet
 $P = 360$ feet
 $W = 40$ feet

*Value of 30' to be used as all yards $\geq 20'$ are also $\geq 30'$

$$= \left[\frac{220}{360} - 0.25 \right] \frac{40}{30}$$

$$= [0.61 - 0.25] 1.0$$

$$= [0.36] 1.0$$

$I_f = 0.36$

Calculation of r frontage increase

Width Limits (Section 506.3.2)

Formula to calculate "weighted average" (W) for frontage increase purposes:

$$W = (L_1 \times w_1 + L_2 \times w_2 + L_3 \times w_3 \dots) / F$$

W = (Width: weighted average) = Calculated width of open space
 L_n = Length of a portion of the exterior perimeter wall
 w_n = Width of open space associated with that portion of the exterior perimeter wall
 F = Building perimeter that fronts on a public way or open space having a width of 20 feet or more

The value of w_n cannot exceed 30 feet.

Open Space Limits (Section 506.3.1)

Entire perimeter considered for frontage increase

Min 20-ft-wide fire lane*

Street

Street

For SI: 1 foot = 304.8 mm.

Open space to be on same lot or dedicated for public use and accessed from a street or approved fire lane

* Fire lane need only be provided to within 150 feet of exterior wall per Section 503.1.1 of the IFC

Open Space Availability
(Section 506.3.1)

Yards to be accessed by street or fire lane

*May be used when approved by the building official

Allowable Area Determination
Single-Occupancy, Multistory (Section 506.2.3)

- No individual story shall exceed the allowable area (A_a) as determined by the equation:

$$A_a = [A_t + (NS \times I_f)] \times S_a$$


- Using the value of $S_a = 1$

Allowable Area Determination
Single-Occupancy, Multistory (Section 506.2.3)

- The allowable area of a single-occupancy building with more than one story above grade plane shall be determined by the following equation:

$$A_a = [A_t + (NS \times I_f)] \times S_a$$


A_a = Allowable building area
 A_t = Tabular allowable area factor (NS, S1, or S13R value, as applicable) in accordance with Table 506.2
 NS = Tabular allowable area factor in accordance with Table 506.2 for nonsprinklered building (regardless of whether building is sprinklered)
 I_f = Area factor increase due to frontage in accordance with Section 506.3
 S_a = Actual number of building stories above grade plane, not to exceed three (not to exceed four for 13R sprinklered buildings)

Allowable Area Determination
Mixed Occupancy, Separated Multistory(506.2.4) 


Allowable area Separated Occupancies
(Section 508.4)


The formula is:
$$a_1/A_1 + a_2/A_2 + a_3/A_3 + \dots \leq 1.0$$

Where a_1 , a_2 and a_3 represent the actual floor areas of the individual occupancies, and A_1 , A_2 and A_3 represent the maximum allowable floor areas.

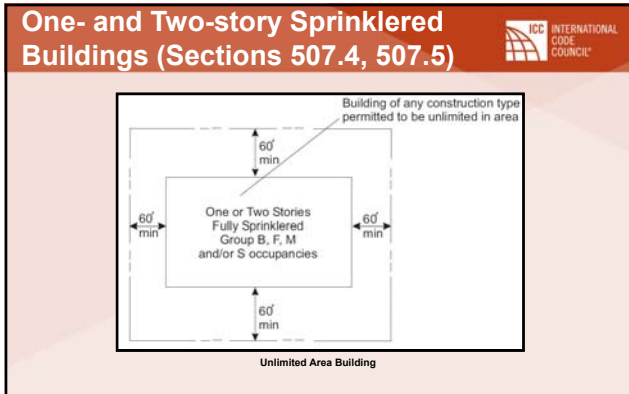


Unlimited Area Buildings



Unlimited Area Buildings
(Section 507.1) 

- Use of Section 507 is limited to the occupancies and configurations specified within the provisions.
- Basements are permitted where not more than one story below grade plane.
- Allowance is made for other occupancies provided they comply with the provisions of Section 508.1.1 for accessory occupancies.



**Unlimited Area Buildings—
Reduced Open Space (Section 507.2.1)**


- The allowance for reducing the required open space from 60 feet (18 288 mm) to 40 feet (12 192 mm) is only permitted for the following unlimited area buildings:
 - One-story nonsprinklered Groups F-2 and S-2 (Section 507.3).
 - One-story sprinklered Groups B, F, M, S and A-4 (Section 507.4).

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**Unlimited Area Buildings—
Reduced Open Space (Section 507.2.1)**

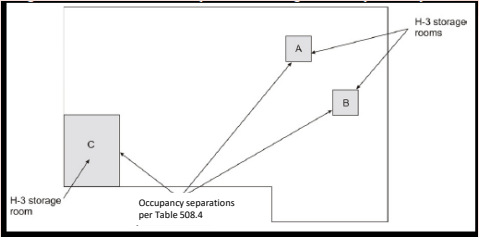
- Two-story sprinklered Groups B, F, M and S (Section 507.5).
- One-story sprinklered Group A-3 (Sections 507.6 and 507.7).
- One-story sprinklered motion picture theaters (Section 507.12).

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**Unlimited Area Buildings—
Group H Occupancies (Section 507.8)** 

- Aggregate floor area of Group H occupancies located at the building's perimeter limited to 10 percent of the actual building area or Group H allowable area per Section 506 with any applicable frontage increase.
- Aggregate floor area of Group H occupancies not located on perimeter of building limited to 25 percent of Group H area limits in Section 506.

Group H in Unlimited Area Buildings—Example 



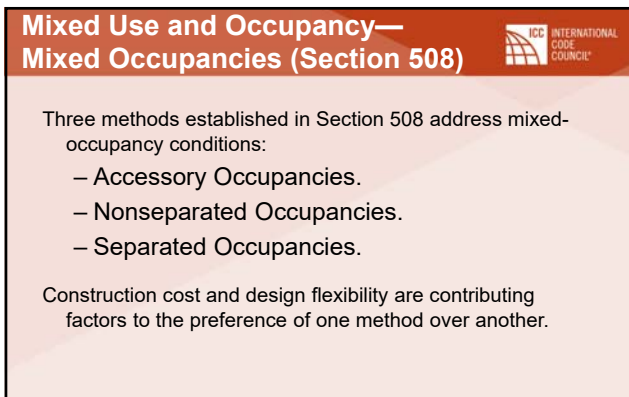
The diagram shows a building footprint with three H-3 storage rooms labeled A, B, and C. Room C is located at the perimeter, while rooms A and B are interior. Arrows indicate occupancy separations between the rooms and the perimeter, with a reference to Table 508.4.

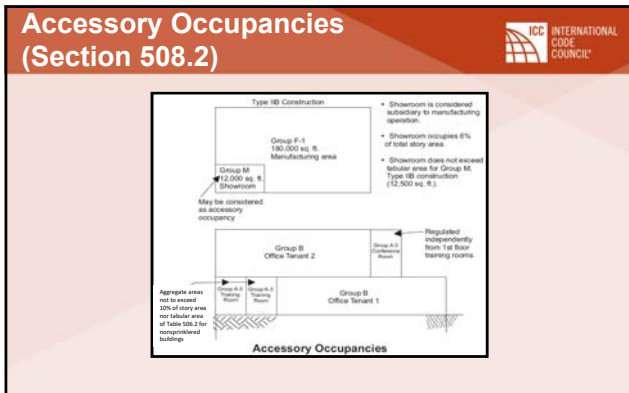
Group H in Unlimited Area Buildings—Example 

• **SOLUTION:**

Aggregate area of Group H to be lesser of:	
Maximum 10% of area of building:	13,000 sf
Area limitations of Table 506.2 as modified: (Based on 14,000 + 3,500 frontage increase)	17,500 sf
Total Group H permitted	13,000 sf
Aggregate area not located at perimeter:	
Limited to 25% of Group H limits of Table 506.2:	3,500 sf
Remainder must be located at perimeter:	9,500 sf







Nonseparated Occupancies (Section 508.3)

Example: Building is to be multistory, fully sprinklered and of Type VB construction. Frontage increase of 30% available. 1st story contains Group M and A-2 occupancies as shown with Group B occupancy above.

Nonseparated Occupancies (Section 508.3.2)

	Group M	Group A-2	Group B
Allowable Area (square feet)	29,700	19,800	29,700
Allowable Height (number of stories)	2	2	3

Using the nonseparated occupancies method, the maximum allowable area is 19,800 square feet per story with a maximum of two stories in the building.

The most restrictive fire protection requirements (typically sprinkler and alarm systems) for each occupancy to be applied to entire building.

Mixed Use and Occupancy—Example

Mixed Use and Occupancy—Example

• SOLUTION:

$$\frac{a_B}{A_B} + \frac{a_U}{A_U} + \frac{a_{S-2}}{A_{S-2}} \leq 1.0?$$

$$92,000 + 0.25(23,000) = 97,750$$

$$a_B = 34,000 \quad A_B = 50,000 + 0.25(12,500) = 53,125$$

$$a_U = 26,000 \quad A_U = 38,000 + 0.25(9,500) = 40,375$$

$$a_{S-2} = 6,000 \quad A_{S-2} = 9,500 + 0.25(9,500) = 40,375$$

$$\frac{34,000}{97,750} + \frac{26,000}{53,125} + \frac{6,000}{40,375} \leq 1.0$$


$$0.35 + 0.49 + 0.15 = 0.99 > 1.0$$

∴ Building complies for allowable area as shown.


Separated Occupancies (Section 508.4)

OCCUPANCY	A, E		I-1, I-2, I-3, I-4		I-2	R ^b	F-1, F-2, U	S-1, S-2		S-1, S-2	H-1	H-2	H-3, H-4		H-5					
	S	T	S	T				S	T				S	T		S	T			
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^c , I-3, I-4	—	—	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	—	—	—	—	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^b	—	—	—	—	—	N	N	1 ^d	2 ^e	1	2	NP	NP	3	NP	2	NP	2	NP	
F-2, S-2 ^f , U	—	—	—	—	—	—	N	N	1	2	NP	NP	3	4	2	3	2	NP		
H-1, F-1, M, S-1	—	—	—	—	—	—	—	N	N	NP	NP	2	3	1	2	1	NP			
H-3	—	—	—	—	—	—	—	—	—	N	NP	NP	NP	NP	NP	NP	NP			
H-2	—	—	—	—	—	—	—	—	—	—	N	NP	1	NP	1	NP				
H-3, H-4	—	—	—	—	—	—	—	—	—	—	—	—	1 ^g	NP	1	NP				
H-5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	N	NP				

^a Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
^b Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
^c N = No separation requirement.
^d NP = Not Permitted.
^e See Section 420.
^f The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.
^g See Section 406.2.
^h Separation is not required between occupancies of the same classification.
ⁱ See Section 422.2 for ambulatory care facilities.
^j Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.



Special Provisions



Horizontal Building Separation Allowance (Section 510.2)

Special Provisions—Parking Beneath Group R (Section 510.4)

Group B or M with an Open Parking Garage Above (Section 510.8)

**Multiple Buildings Above Group S-2
Parking Garages (Section 510.9)**

Regulated as separate buildings from each other for application of:

- Section 510.2
- Section 510.3
- Section 510.8

Group S-2 parking garage

Horizontal separation

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Summary/Q&A

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